



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII  
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KANSAS CITY, KANSAS 66101

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September 24, 2002

James S. Mitchell  
Rasmussen & Mitchell  
11605 Miracle Hills Drive, Suite 204  
Omaha, Nebraska 68154-4442


Re: Lockwood/Agromac Superfund Site

Dear Mr. Mitchell:

Enclosed please find a copy of the Final Report for the Removal Site Evaluation at the referenced-site. This report contains the results and conclusions of Agency's contractor. The Agency is preparing a Removal Action Memorandum to take the final abatement action at this Site.

Thank you for your time this morning on the teleconference. We look forward to receiving your comments on the Bankruptcy Settlement as soon as possible.

Sincerely,

  
E. Jane Kloeckner  
Sr. Assistant Regional Counsel

cc: Annette Kovar, NDEQ

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**U.S. Environmental Protection Agency  
Region 7**

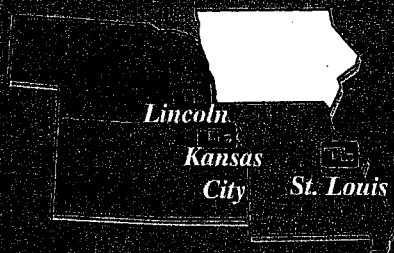
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**Superfund Technical Assessment and  
Response Team (START) 2 Contract**

*Contract No. 68-S7-01-41*

**Final Report**

**Agromac-Lockwood  
Operable Unit 2  
Gering, Nebraska**



**Tetra Tech EM Inc.**



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## **Tetra Tech EM Inc.**

8030 Flint Street ♦ Lenexa, Kansas 66214 ♦ (913) 894-2600 ♦ FAX (913) 894-6295

March 22, 2002

Mr. Roy Crossland  
START Project Officer  
U.S. Environmental Protection Agency, Region 7  
901 North 5<sup>th</sup> Street  
Kansas City, Kansas 66101

**Subject: Final Report for Removal Assessment Activities at  
Agromac-Lockwood Operating Unit Number 2, Gering, Nebraska  
EPA Region 7 START 2, Contract 68-S7-01-41, Task Order 0008.10  
Task Monitor: Kevin Larson, On-Scene Coordinator**

Dear Mr. Crossland:

Tetra Tech EM Inc. (Tetra Tech) is submitting this final report summarizing the removal assessment (RA) portion of an integrated site assessment (ISA) at the above-referenced site. The objectives of the RA were to assess current site conditions and evaluate whether a removal action at the site is warranted.

If you have any questions or comments regarding this report, please call the project manager at (913) 495-3945.

Sincerely,

Jeff Hodge  
START Project Manager

Hieu Q. Vu, PE, CHMM  
START Program Manager

Enclosure

cc: File

G9011/0008.10

**FINAL REPORT FOR  
REMOVAL ASSESSMENT ACTIVITIES AT  
AGROMAC-LOCKWOOD OPERATING UNIT NUMBER 2 SITE, GERING, NEBRASKA**

**Superfund Technical Assessment and Response Team (START) 2**

**Contract No. ~~68~~-S7-01-41, Task Order No. 0008.10**

Prepared For:  
U.S. Environmental Protection Agency  
Region 7  
901 North 5<sup>th</sup> Street  
Kansas City, Kansas 66101  
March 14, 2002

Prepared By:  
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## 1.0 INTRODUCTION

The Tetra Tech EM Inc. (Tetra Tech) Region 7 Superfund Technical Assessment and Response Team (START) was tasked by the U.S. Environmental Protection Agency (EPA) Region 7 Superfund Division to conduct an integrated site assessment (ISA) at the Agromac-Lockwood Operating Unit 2 site, under Task Order No. 0008.10, Contract No. 68-S7-01-41. The ISA was a combination of a preliminary assessment and site inspection (PA/SI) and a removal assessment (RA). This report pertains solely to the RA portion of the ISA. The purpose of the RA was to define the nature and extent of contaminants at the Agromac-Lockwood Operating Unit 2 site that could warrant follow-up response under a removal action.

Mr. Jeff Hodge was the Tetra Tech START project manager for the RA activities. The EPA On-Scene Coordinator (OSC) for the project was Kevin Larson.

Section 2.0 details the location and description, operational history, and previous investigations of the site. Section 3.0 summarizes field activities conducted for this RA. Section 4.0 discusses analytical results generated for this RA. Section 5.0 discusses the comparability of the on-site and off-site analytical results. Section 6.0 offers recommendations on future site removal actions. Section 7.0 lists the references used in the report.

## 2.0 BACKGROUND INFORMATION

This section provides information on the site location, site description, operational history, and previous investigations conducted at the site.

### 2.1 SITE LOCATION AND DESCRIPTION

The Agromac-Lockwood Operating Unit 2 site is located 0.5 mile east of Gering, Nebraska (see Appendix A, Figure 1). The geographic coordinates of the site are latitude 41°82'11" north and longitude 103°63'69" west. The site is located on the Scottsbluff South, Nebraska, 7.5-minute quadrangle map, in the southeast quarter of Section 1, Township 21 North, Range 55 West (U.S. Geological Survey [USGS] 1963, revised 1976). The street address of the site is 220759 Highway 92, Gering, Nebraska.

The site is located on 80 acres in an industrial park and is bounded to the north by Nebraska Highway 92, to the east by several private residences, to the south by farmland, and to the west by a rail spur and additional industrial facilities. The property has been used by several different corporations to manufacture farm machinery and irrigation equipment. Currently, no manufacturing operations are being conducted at the site. The main warehouse in the northern portion of the site is being leased by the Western Sugar Company (WSC) for storage of raw sugar and packaging materials. The entire 80-acre site is owned by Agromac International, Inc. (AII), except for 3 acres owned by the City of Gering for use as an electrical substation and a closed, 1-acre surface impoundment still owned by Lockwood Industries, Inc. (LII).

## 2.2 REGULATORY HISTORY

LII notified the EPA on August 13, 1980, that it was a treatment, storage, and disposal facility for flammable and corrosive characteristic wastes D001 and D002, as defined under the Resource Conservation and Recovery Act (RCRA) (Nebraska Department of Environmental Conservation [NDEC] 1986a). The EPA subsequently removed LII from the Hazardous Waste Data Management System on June 3, 1981. The facility was inspected on August 18, 1982 by NDEC, which conducted the first compliance evaluation inspection (CEI) at the facility on that date. Chemical analysis of waste streams being generated by the facility at the time resulted in LII submitting a revised Hazardous Waste Notification on May 23, 1983. On March 3, 1984, another CEI was conducted by NDEC. Inspectors observed a leak in a surface impoundment; where the influent pipe had eroded the liner, and waste acid had leaked into the surrounding soil (HWS Technologies Inc. [HWS] 1989). As a result of this CEI, NDEC issued an Administrative Order for LII to cease using surface impoundments (EPA 2001b).

LII constructed two surface impoundments in the southwestern corner of the site for neutralization of spent acid waste from galvanizing and chain manufacturing operations. These surface impoundments were used to neutralize 5 to 15 percent waste sulfuric acid piped from the galvanizing process. This acid was disposed of at a rate of 10,000 to 16,000 gallons per week, which was then neutralized by adding ammonium hydroxide (HWS 1989). The north and south impoundments were 100 by 100 feet and 100 by 90 feet, respectively, each with a depth of 4 feet. The southern impoundment was constructed in 1972 and was unlined. It was used until 1978, when it was replaced by the northern impoundment. The northern impoundment was constructed with a 0.25-inch bentonite liner and was used until 1984, when

NDEC issued the Administrative Order, which required closure of the surface impoundments (HWS 1989). Sampling of the waste in the surface impoundments indicated that the pH of the liquid waste was frequently below 2.0. Waste sulfuric acid generated at the galvanizing plant was sampled, and it contained cadmium (20 milligrams per liter [mg/L]), lead (28 mg/L), and zinc (67,500 mg/L) (HWS 1989; NDEC 1986a) (see Attachment 1). This waste sulfuric acid was a RCRA characteristic waste for corrosivity (D002), cadmium (D006), and lead (D008), based on these analytical results.

In August 1984, a preliminary hydrogeologic investigation was completed by HWS. Soil samples collected during this investigation were analyzed for metals using the Extraction Procedure (EP) Toxicity test. Analytical results indicated that arsenic, cadmium, chromium, lead, mercury, and zinc were present in soil in the surface impoundments, although the concentrations observed were below regulatory limits for regulated hazardous waste (HWS 1989). Total metals analysis of the soil samples collected from the surface impoundments showed the presence of cadmium, chromium, hexavalent chromium, lead, and mercury (HWS 1989).

A closure plan and a post-closure plan were submitted by HWS in September 1985. Closure of the surface impoundments was conducted in November 1986 (HWS 1989). Closure activities involved pushing in the dike, and covering each impoundment with a 6-inch layer of lime, 1-foot layer of compacted soil, a 20-mil polyvinyl chloride (PVC) liner, and another 1- to 2-foot layer of compacted soil (HWS 1989). A post-closure permit was issued in September 1989 for these surface impoundments.

### **2.2.1 RCRA Compliance Inspections**

Numerous CEIs have been conducted at this facility by NDEC, the Nebraska Department of Environmental Quality (NDEQ) (the successor to NDEC), and EPA. From August 18, 1982, to May 6, 1999, at least 13 CEIs have been conducted at the facility. Numerous violations were noted during these inspections. Frequent violations included failure to make adequate waste determinations, failure to close and secure drums, numerous paperwork violations on hazardous waste manifests, and failure to dispose of hazardous waste within 90 days.

### 2.2.2 RCRA Solid and Hazardous Waste Streams

During the CEIs the following major waste streams were observed:

- Spent pickle liquor, D002, waste sulfuric acid from galvanizing operations. The facility generated 11,000 to 13,000 gallons per month. This waste was stored on site in a 40,000-gallon in-ground pit south of the galvanizing building.
- Spent pickle liquor, D002, waste hydrochloric acid used in chain production line. The facility generated as much as 400 gallons per week. This waste was stored on site in the 40,000-gallon in-ground pit south of the galvanizing building.
- Waste acid sludge, D002, generated during cleaning of acid dip tanks. The facility generated 150 to 1,500 drums per year, and it frequently stored this waste in drums with open tops in a gravel-covered hazardous waste storage area south of the galvanizing building.
- Caustic sludge, D002, generated during cleaning of caustic dip tanks. The facility generated 4 to 15 drums per year. Although the storage area that used this waste is unknown, it was presumably located at the hazardous waste storage area south of the galvanizing building.
- Spent solvents, D001, generated in parts washers (as many as 13), which were located throughout the facility. The facility generated as much as 1,700 pounds per month. Parts washers were serviced by Safety-Kleen and other commercial contractors. Some inspectors noted that wastes from parts washers were handled as the following RCRA characteristic hazardous wastes: D006 (cadmium), D008 (lead), D018 (benzene), D036 (nitrobenzene), D039 (tetrachloroethene [PCE]), and D040 (trichloroetene [TCE]) (EPA 1997). These waste determinations were made using process knowledge. A report for a CEI conducted by NDEC on June 2, 1986, contained a list of chemicals in use at the facility that included PCE, which was being used as a "safety solvent" (NDEC 1986b).
- Waste methyl-ethyl-ketone (MEK), xylene, acetone, isopropyl alcohol, and toluene; D001, F003, and F005. These wastes were generated during spray paint equipment cleanup activities. The facility generated as much as 1,330 gallons per month. These materials were stored in hazardous waste storage areas east and south of the main manufacturing building, south of a galvanizing building, in satellite accumulation areas in a paint storage area, in a solvent recycling area, and in open areas south of the solvent recycling area.
- Waste paint sludges, D001, F003, F005, generated in spray paint booths. The facility generated up to 12 drums per month. Analyses of paint sludges conducted in 1984 by NDEC found high concentrations of lead (18,120 milligrams per kilogram [mg/kg]), zinc (8,050 mg/kg), and chromium (3,810 mg/kg) (EPA 1988). In 1997, the EPA determined that the paint sludges were characteristic hazardous wastes for chromium (D007), lead (D008), and MEK (D035), based on analyses performed by Safety-Kleen (EPA 1997).



This waste was stored in hazardous waste storage areas south and east of the main manufacturing building, south of the galvanizing building, in satellite accumulation areas in the paint storage area, in the solvent recycling area, and in open areas south of the solvent recycling area.

- Waste paint and solvents, D001, F003, and F005; off-specification paint, still bottoms, and unusable solvents generated by spray paint operations. The facility generated as much as 35,500 pounds per year (NDEC 1991). These materials were stored in hazardous waste storage areas south and east of the main manufacturing building, south of the galvanizing building, in satellite accumulation areas in the paint storage area, in the solvent recycling area, and in open areas south of the solvent recycling area.
- Used oil and spent coolant, RCRA non-hazardous; includes quench oils, hydraulic oils, honing oils, motor oil, and spent coolant from machining processes. The facility generated as much as 500 gallons per month. Coolants were discharged to the municipal sewer and were mixed with waste oils. In 1997, the used oils were placed in a sump at the northeastern corner of the property, where excess water was evaporated prior to disposal by used oil recyclers (EPA 1997). Waste oils were also stored in totes located near the southeastern corner of the galvanizing building, on various hazardous waste storage pads, and in an open area on the southeastern corner of the facility.
- Scrap metal, RCRA non-hazardous; includes zinc skimmings and dross. The facility generated between 10,000 and 20,000 pounds per month. These materials were stored in open areas south of the galvanizing buildings and in various warehouses.
- Beta acid crystals, not considered a waste. The beta acid crystals were sold to various companies, including Nutra-Flo for use as a food additive (EPA 1997). These crystals were generated when impurities were removed from waste acid. The waste acid was piped from the spent acid pit to process tanks that were located in a shed on the southern side of the galvanizing building known as the beta acid shed. The facility generated as much as 25 tons per month. Beta acid crystals were identified as zinc sulfate and iron sulfate heptahydrate, although no analytical data identifying their chemical composition were found in the inspection reports. In 1991, the beta acid crystals were sent to Cozinco, Salida in Colorado (NDEC 1991). Beta crystals were allowed to accumulate until the facility had 25 tons of crystals, which were stored in an unspecified warehouse. Beta acid crystals were also sent off site for disposal as non-hazardous waste during a site cleanup conducted in 1996 (Consolidated Industrial Services [CIS] 1996).
- Process waste waters; includes waste waters from the iron phosphate parts washing process, paint line rinse waters, caustic water treatment rinse waters, galvanizing rinse waters, and non-contact cooling waters. The facility discharged 22,000 gallons per day to the sanitary sewer. Waste waters from the iron phosphate parts washing process and paint line rinse waters were discharged to sewer lines 001 and 002. Rinse water from caustic treatment in the chain production line was discharged to sewer line 003, and cooling water and rinse water from the galvanizing area was discharged to sewer line 004. In 1987, the facility was in violation of newly promulgated metal finishing pretreatment requirements for discharges to municipal sewers (EPA 1988).

- Metal shavings, not RCRA hazardous. The facility produced as much as 1,000 pounds per month. These were placed in roll-off bins east of the manufacturing building. Staining from oils on the shavings were observed on the ground around the roll-off bins.
- Burn pit ash, not RCRA hazardous, based on analytical data furnished to an inspector. Thirty cubic yards were generated by burning trash and debris (EPA 1988). The facility disposed of the material at the Gering municipal landfill. The burn pit was located in an open area on the eastern side of the facility (see Appendix A, Figure 2).

### 2.2.3 Suspected Waste Management Units

During the CEIs, the following solid waste management units (SWMU) were observed:

- A 40,000-gallon, in-ground tank with no secondary containment was used to store acid wastes from sulfuric acid and hydrochloric acid process tanks.
- Up to 13 parts washers were used throughout facility, mostly in the northern manufacturing warehouse.
- Beta acid crystals were stored in an open area due south of the galvanizing building in 1991 and were later moved to a salvage materials warehouse along the eastern edge of the facility property. Beta acid crystals were stored in the northwestern corner of the salvage materials warehouse.
- Beta acid crystals and waste materials from process clean-out operations were stored in the beta acid recycling facility, the galvanizing plant, open areas south of the galvanizing plant, and the salvage warehouse, frequently without labels or waste determinations.
- Zinc dross, skimmings, and galvanizing kettle ash were stored in the open areas south of the galvanizing building during many inspections. They were also stored in the northwestern corner of the salvage materials warehouse.
- A burn pit, located northeast of the galvanizing building, was being used for disposal of solid waste, including wood, paper, plastic, and food scraps, by open burning without a permit.
- Areas of stained pavement south of the galvanizing building were caused by spilled acid being placed in the 40,000-gallon waste acid storage tank.
- A hazardous waste storage area was located south of the galvanizing building. Hazardous wastes stored in this area included dried paint sludges, waste solvents, waste oils, super sacks filled with beta acid crystals, and open drums of acid sludge. This area was originally a large gravel area; however, a new concrete pad with curbing and an in-ground concrete sump for the collection of rainwater was constructed here in about 1994 (ENSR Consulting and Engineering [ENSR] 1994). This concrete pad is located just

outside the southeastern corner of the original gravel hazardous waste storage pad. Wastes were also stored in a staging area north of the hazardous waste storage area.

- A raw product storage area was located south of the northern manufacturing building. This area was used to store new drummed products, including paint and solvents. Waste paints, solvents, and waste oils were frequently observed mixed in with the drummed products. Some photographs taken in this area show aboveground storage tanks (AST) that were used to store solvents, such as MEK, used in cleaning paint guns. Spills were observed in the soil around these ASTs (EPA 1988).
- A solvent recycling area was located on the southern side of the northern manufacturing warehouse in a concrete block structure also known as Blockhouse 925. Waste paints and solvents generated during painting operations were recovered using a solvent recovery still. Open drums of paint waste and solvents were frequently noted in this area, which was used as a satellite accumulation area. Inspectors frequently noted an excessive number of drums and materials that had been stored for over 90 days in this area. The open paved area, south of the solvent recycling area was frequently used for storage of drummed paint wastes and solvents, often in open drums.
- A satellite accumulation area for paint wastes was located adjacent to the paint line inside the northern manufacturing warehouse. Inspectors frequently noted an excessive number of drums and materials that had been stored for over 90 days in this area.
- Two underground storage tanks (UST) (a 1,000-gallon gasoline tank and a 6,000-gallon diesel tank) were located north of the guard house at the east entrance to the facility. These tanks were removed in 1991. They had passed a leak test the previous year and were in good condition when they were removed. There was some visual and olefactory evidence suggesting that the tanks may have leaked, which was noted by the removal contractor. A closure report was submitted in 1994. The closure report stated that soil samples collected in the vicinity of the tanks had total petroleum hydrocarbon (TPH) concentrations of less than 10 mg/kg (Sorensen 1997a).

#### 2.2.4 RCRA Facility Assessment Sampling

Several sampling events have been conducted at the Agromac-Lockwood facility. An RCRA facility assessment (RFA) was conducted in September 1987 by Versar, Inc., where 10 shallow soil samples were collected from the following five SWMUs:

- Four areas of stained soil in the waste oil storage area in the southeastern corner of the site
- The raw product storage area south of the solvent recycling facility, at which one of these samples was collected from an area of discolored soil where an AST used for storing line stripper solvent had leaked

- A drainage swale along the western edge of the facility, downgradient of the raw product storage area
- The gravel-covered portion of the original hazardous waste storage south of the galvanizing building, an area of stained soil
- A scrap metal waste bin area on the eastern side of the facility near the guard house

In addition, two background soil samples were collected. The soil samples were analyzed for base neutral acids (BNA), and total metals. Sampling locations and analytical results from the RFA are included as Attachment 2.

The detection limits for BNAs were significantly elevated, ranging from 25 to 240 parts per million (ppm) (EPA 1988). Few BNAs were detected during the RFA. Low levels of naphthalene and 2-methylnaphthalene were detected in the raw product storage area. Bis(2-ethylhexyl)phthalate was detected in the hazardous waste storage area and the scrap metal waste bin area.

The metals data were evaluated by comparing SWMU sample concentrations to background sample concentrations. A sample result of at least three times or more above background was considered significant. No significantly elevated concentrations of metals (above background concentrations) were reported in the waste oil storage area. In the raw product storage area, elevated concentrations of chromium (76 mg/kg), lead (306 J mg/kg), and zinc (300 mg/kg) were detected, as compared with the background samples. The downgradient drainage way sample contained elevated concentrations of chromium (43 mg/kg) and lead (600 J mg/kg) (EPA 1988). Soil samples collected from the scrap metal waste bins area contained elevated levels of cadmium (21 mg/kg), chromium (260 mg/kg), copper (610 mg/kg), iron (160,000 mg/kg), lead (210 J mg/kg), nickel (150 mg/kg), and zinc (750 mg/kg), as compared to background concentrations. Elevated levels of lead (600 J mg/kg) and zinc (15,000 mg/kg) were detected in the single soil sample collected from the hazardous waste storage area. The J-code indicates that the data were qualified, and the stated concentration is an estimated value.

Three on-site monitoring wells, M-4 and M-1 downgradient of the surface impoundment, and M-8 upgradient of the surface impoundment, were sampled during the RFA. Two private wells were also sampled. One well is 2,600 feet north of the surface impoundment, and the other private well is located 2,000 feet northeast of the surface impoundment. Gering municipal well 6, located about 1,500 feet

north-northwest of the surface impoundment was also sampled. No analytes in the drinking water wells exceeded maximum contaminant levels (MCL) for drinking water. A large increase in total zinc concentrations in private well A from 27 parts per billion (ppb) in 1984 to 550 ppb in 1987 was noted. The on-site monitoring wells were sampled and analyzed for volatile organic compounds (VOC), total and dissolved metals, cyanide, and sulfates. No VOCs were detected in the on-site monitoring wells. Total and dissolved metals, including calcium, iron, manganese, magnesium, potassium, and zinc were significantly more elevated in the downgradient monitoring wells. The levels of sulfates were also much higher in the downgradient wells, and the pH was somewhat lower. The RFA concluded that the data suggested the closed surface impoundments were impacting groundwater quality.

The analytical data from the soil sampling conducted in the waste oil storage area were not conclusive, but there was visual evidence of releases. Drums of waste paint were stored in this area. There was visual evidence of a release in the raw product storage area, and the organic and metals data supported the determination that a release had occurred. Oil residues and metal shavings were noted in the soil around the scrap metal waste bin area, and elevated concentrations of some metals supported a determination that a release had occurred. Visual evidence of a release in the hazardous waste storage was limited, and the analytical data for this area were inconclusive as to whether a release had occurred.

Several suspected SWMUs were not sampled during the RFA. A borrow pit at the southern side of the eastern entrance of the facility was used for disposal of spent coolant from the machine shop. This area was not sampled during the RFA, because there was no visual evidence of a release and the waste coolant was deemed non-hazardous. The area around the 40,000-gallon spent sulfuric acid tank and the solvent recycling unit were not sampled because a release of the wastes in these areas was unlikely due to the construction design of the units. The RFA report noted that an effluent tank installed in 1972 for the storage of spent acids was replaced by the current 40,000-gallon spent acid tank, which was installed in 1984.

#### **2.2.5 RCRA Facility Investigation**

A RCRA facility investigation (RFI) was conducted in two phases, with sampling conducted in April 1992 and June 1994. Two rounds of groundwater sampling were also conducted from designated RFI

monitoring wells in 1992 and 1993. The data from these reports were included in summary reports. No final RFI report was available in the reviewed files.

#### **2.2.5.1 RFI Soil Sampling**

Soil sampling was conducted at five SWMUs during the RFI. The soil sampling locations and analytical results of soil sampling conducted during the RFI are included as Attachment 3. The following sections describe the soil sampling at each SWMU.

##### **2.2.5.1.1 Hazardous Waste Storage Area**

During the RFI, 12 soil samples and one field duplicate were collected from depths ranging from 0 to 5 feet below ground surface (bgs) within the hazardous waste storage area and were analyzed for cadmium, lead and zinc. No EPA action levels were exceeded, but elevated levels of lead (up to 170 mg/kg) and zinc (up to 3,300 mg/kg) were noted in comparison to the background concentrations established during the RFA (ENSR 1994).

##### **2.2.5.1.2 Waste Oil Storage Area**

Twelve soil samples and three field duplicates were collected from the waste oil storage area at depths ranging from 0 to 5 feet bgs. Soil samples were analyzed for selected metals, VOCs, semivolatile compounds (SVOC), and TPH. Four soil samples and one field duplicate were analyzed for arsenic. Arsenic was detected in all four samples at concentrations as high as 3.4 mg/kg, but all detections were below RFA background levels and the EPA action level (80 mg/kg) (ENSR 1994). Nine soil samples and three field duplicates were analyzed for lead. Lead was detected in concentrations as high as 310 mg/kg, and many of the results were significantly above the RFA background concentrations. The EPA action level of 500 mg/kg was not exceeded. Ten soil samples and three field duplicates were analyzed for zinc. Zinc was detected at concentrations as high as 5,600 mg/kg, and many samples significantly exceeded the RFA background concentrations. No EPA action level was promulgated for zinc. Three soil samples were analyzed for SVOCs. No detections of SVOCs were reported. Detection limits for the SVOCs ranged from 330 micrograms per kilogram ( $\mu\text{g/kg}$ ) to 1,700  $\mu\text{g/kg}$ . These are well below the current Region 9 EPA Preliminary Remediation Goals (PRG) for industrial soil (EPA 2000a). Four soil samples

were analyzed for VOCs. One soil sample contained 1,1,1-trichloroethane (1,1,1-TCA) at a concentration of 56 µg/kg. Oil and grease concentrations as high as 5,900 mg/kg were detected in surface soil samples collected in the waste oil storage area, and concentrations as high as 2,300 mg/kg were detected in samples collected outside the waste oil storage area, provides an indication of the extent of contaminant migration.

#### **2.2.5.1.3 Scrap Metal Waste Bin Area**

Eight soil samples and one field duplicate were collected from the scrap metal waste bin area, at depths of 0 to 5 feet bgs. Eight soil samples were analyzed for lead and zinc. Lead was detected at a maximum concentration of 86 mg/kg, and several samples had concentrations significantly above the background levels reported during the RFA. No EPA action levels for lead were exceeded. Zinc concentrations were not significantly elevated.

#### **2.2.5.1.4 Stained Soil Areas**

Four soil samples were collected from depths of 0 to 2 feet bgs in an area of stained soil located south of the hazardous waste storage area, which is south of the galvanizing building. This area had been used to store empty drums. These soil samples were analyzed for RCRA metals and VOCs. Methylene chloride, a possible laboratory contaminant, was detected in shallow soil samples. Lead was the only metal detected at concentrations that significantly exceeded the RFA background concentrations. The maximum lead concentration, 410 mg/kg, did not exceed the EPA action level.

#### **2.2.5.1.5 UST Areas**

Two soil samples were collected by the two USTs located near the east entrance to the facility. These samples were analyzed for TPH, but the results were not included in the RFI report.

#### **2.2.5.2 RFI Groundwater Sampling**

Two rounds of groundwater sampling were conducted as part of the RFI in 1992 and 1993. Only the data from the second round of groundwater samples were located in the EPA files that were reviewed.

Groundwater samples in selected on-site monitoring wells were analyzed for various groundwater parameters, including various ions, pH, sulfates, nitrates, selected metals, and VOCs (ENSR 1993). The analyses performed varied considerably from well to well. For example, only four of the 13 on-site monitoring wells were sampled for VOCs. Significant concentrations of VOCs were detected in all four wells. A potentiometric surface map and iso-concentration map showing the distribution of these VOC results is provided as Attachment 4. TCE was detected in monitoring well LW-3 (16 micrograms per liter [ $\mu\text{g/L}$ ]), and LW-7 estimated (2  $\mu\text{g/L}$ ). PCE was detected in monitoring wells LW-3 (15  $\mu\text{g/L}$ ), LW-7 (29  $\mu\text{g/L}$ ), LW-8 estimated (2  $\mu\text{g/L}$ ), and RF-5 (36  $\mu\text{g/L}$ ). Most of the monitoring wells sampled were analyzed for lead and manganese only.

Monitoring well LW-1 was the only monitoring well sampled for most metals. No significant concentrations were detected; however, this well is located in the northwestern corner of the facility, away from known sources of contamination. Monitoring well LW-1 is also in a location where the flow of groundwater to that well would be from off-site areas. The predominant flow of groundwater on site is to the northeast.

Groundwater samples analyzed for nitrates and nitrites were reported as total nitrogen. Only one monitoring well sample exceeded the MCL for nitrates (10 mg/L). The MCL for nitrites is lower (1 mg/L). The groundwater results were reported only as total nitrogen, however, so it could not be determined if the MCL for nitrites was exceeded. Sulfate concentrations in many of the monitoring wells exceeded the secondary MCL of 250 mg/L.

Also sampled as part of the RFI were three private wells and City of Gering municipal well 6. The locations of these wells is shown on Attachment 5. Municipal well 6 is labeled MUNI-1 on the well location map. The private and municipal well samples were analyzed for sulfates, combined nitrites and nitrates, total cyanides, VOCs, and total metals. The sulfate concentrations in most of the wells exceeded the secondary MCL. The total nitrate and nitrite concentrations detected in the drinking water wells did not exceed 10 mg/L. Most metals results for the drinking water samples were non-detections and no MCL was reported for any metals. No site-related VOCs were detected in the off-site wells (ENSR 1993).



### 2.2.5.3 Additional Groundwater Sampling

In October 1985, 10 monitoring wells were installed in the vicinity of the closed surface impoundments (HWS 1989). These wells were named MW-1 through MW-10 and are located in the southwestern corner of the site. The locations of these wells are shown on Attachment 4. Groundwater sampling from some of these wells was conducted quarterly from 1985 to 1989 and indicated the presence of elevated concentration of zinc (up to 1,400 µg/L), arsenic (up to 31 µg/L), cadmium (up to 12 µg/L), chromium (up to 30 µg/L), silver (up to 110 µg/L), and lead (up to 30 µg/L) (HWS 1989). Also detected were high levels of sulfates (up to 2,700 mg/L) and nitrates (up to 19 mg/L). VOCs have been detected sporadically in samples collected from the monitoring wells installed around the closed surface impoundments.

Post-closure samples were collected from monitoring wells MW-3, MW-4, MW-6, and MW-7, which were sampled quarterly for metals and selected ions from 1988 to 1993. Sulfate concentrations as high as 3,600 µg/L were detected. Concentrations of several metals were also detected during this groundwater sampling including; arsenic (up to 40 µg/L), silver (up to 90 µg/L), and zinc (up to 760 µg/L).

Compliance monitoring continued from 1993 to 1998, using a slightly modified protocol. Monitoring wells MW-1, MW-3, MW-4, MW-6, MW-7, and MW-8 were sampled for cadmium, lead, silver, and VOCs on a quarterly basis. The metals results were reported as non-detections at detection limits ranging from 3 to 10 µg/L. In 1993, a PCE concentration of 15 µg/L was detected in MW-4 (ENSR 1993). In 1997, three samples were collected from monitoring well MW-4, which indicated that low concentrations of TCE (1.2, 1.1, and 1.6 µg/L) were present (Sorensen 1997b). In 1998, a low concentration of PCE (1.1 µg/L) was detected in monitoring well MW-6.

In March 1994, monitoring wells MW-3, MW-4, MW-6, and MW-7, located around the closed surface impoundments, were sampled and analyzed for full-priority pollutants, which included metals, pesticides, SVOCs, and VOCs (Sorensen 1994). These samples were collected as part of a RCRA Part B post-closure permit application for the surface impoundments. Only metals were detected in this round of groundwater sampling. Concentrations of arsenic were detected in monitoring wells MW-4 (0.023 mg/L) and MW-7 (0.023 mg/L). Cobalt concentrations were also detected in monitoring wells MW-4 (0.013 mg/L) and MW-7 (0.012 mg/L). Zinc was detected in monitoring wells MW-3 (0.21 mg/L), MW-4 (0.16

mg/L), and MW-6 (0.07 mg/L). Nickel was detected in monitoring wells MW-3 (0.02 mg/L) and MW-4 (0.04 mg/L).

In September 1999, the USGS performed additional groundwater sampling at the Agromac-Lockwood site (USGS 2000). Three on-site monitoring wells and six off-site private wells were sampled. The three monitoring wells selected were those where VOCs were detected during the RFI. The concentrations of VOCs in samples from these wells were significantly lower during the USGS sampling than the concentrations detected during the RFI. PCE was detected in samples from three monitoring wells: LW-3 (2.1 µg/L), LW-7 (0.98 µg/L), and RF-5 (1.3 µg/L). TCE was detected in samples from two of the monitoring wells, LW-3 (3.8 µg/L) and LW-7 (0.95 µg/L). One off-site well, PW-3, contained PCE at an estimated concentration of 0.27 µg/L. No other VOCs were detected. Nitrate concentrations in samples from the on-site monitoring wells and one off-site well, PW-3, exceeded the MCL. The USGS report noted that most of the private wells sampled were located cross-gradient from the site with respect to groundwater flow. The private well directly inline with the anticipated direction of groundwater flow was not sampled because the owner refused permission. The locations and concentrations of the groundwater samples collected during the 1999 USGS sampling are included as Attachment 5.

### 3.0 SAMPLING ACTIVITIES

A Quality Assurance Project Plan (QAPP) was developed following the site reconnaissance activities and file review. The QAPP focused on 20 potential source areas. The 20 potential source areas targeted for sampling were used by Agromac-Lockwood as a scrap metal pad, burn pit, spent acid pit, borrow pit, solvent recycling and paint mixing area, surface impoundment, galvanizing building, septic tank, sewer line, storage areas, sumps, and storm water drainage ditches. There were seven separate storage areas. These storage areas previously contained a variety of materials that included raw products, scrap metal, used oil, empty drums, and hazardous waste. Four hazardous waste storage areas were identified as individual potential source areas. The hazardous waste storage areas have been named A, B, C, and D. Two sumps remained open (had not been backfilled with concrete) from previous operations. These sumps were located adjacent to the scrap metal pad area and hazardous waste storage area D. Two storm water drainage ditches were sampled as potential source areas because of their potential to collect runoff. Potential source areas are illustrated in Appendix A, Figure 2.

Sampling activities were conducted from January 14 through 24, 2001. Tetra Tech START collected soil, groundwater, monitoring well, private well, sludge, wastewater, and soil gas samples. On-site Tetra Tech START personnel included Jeff Hodge, Adam Elliott, Ben Wolfe, Trisha Dealy, Sharon Martin, David Hickey, and Stephanie McCaslin. Tetra Tech START subcontractor personnel on site included Crystal Roberts and Eric Scott from the Denver, Colorado, office of URS, Inc., and Rick Claytor from Seagull Environmental Technologies, Inc. Mr. Hodge acted as the field project manager. Mr. Hickey and Ms. Martin provided field analytical services with the mobile laboratory program (MLP). The MLP analyzed soil, water, sludge, and soil gas samples for VOCs using a gas chromatograph (GC) and soil samples for metals using a NITON™ x-ray fluorescence (XRF) spectrometer. Mr. Elliott, Mr. Claytor, and Mr. Scott conducted Geoprobe™ direct-push sampling, as Mr. Wolfe, Ms. Roberts, and Ms. Dealy assisted. Messrs. Hodge, Elliott, Claytor, Wolfe, and Scott and Mss. Dealy, Martin, McCaslin, and Roberts collected samples, performed sample management, and documented field activities. A copy of the field logbook is provided as Appendix B, and photographic documentation is provided as Appendix C. All sampling was conducted in accordance with the QAPP, which was approved by the EPA on January 11, 2001, and all MLP analytical activities were conducted in accordance with standard operating guidelines (SOG). Deviations from the QAPP and the SOGs were discussed in the trip report submitted on February 21, 2001. All sample locations and selected site features were recorded using a back pack-mounted global positioning system (GPS) receiver. A copy of this GPS data is provided as Appendix D.

The remainder of this section presents a summary of field activities conducted during the RA. A discussion of the sample nomenclature used is presented in Section 3.1. Section 3.2 describes soil sampling activities. Geoprobe™ temporary groundwater well sampling activities are discussed in Section 3.3. Monitoring well, private well, and municipal well sampling activities are described in Section 3.4. Section 3.5 describes sludge and wastewater sampling activities. Soil gas activities are described in Section 3.6. A discussion of hazardous categorization and drum inventory activities is presented in Section 3.7. Section 3.8 describes quality assurance sampling activities. Investigation Derived Waste (IDW) activities are presented in Section 3.9.

### 3.1 SAMPLE NOMENCLATURE

Prior to mobilizing to the site, all sampling points were assigned a sample identification number. The waste management unit being sampled was given an identifier as shown in Appendix E. The next component of the sample identification number was the matrix identifier (also shown in Appendix E). Each point within each waste management unit was assigned a number or grid position. Geoprobe™ temporary groundwater wells and soil gas sampling points were numbered sequentially because many of these points were not necessarily tied to a specific waste management unit. The final number in the sample identifier is the soil sampling interval (in feet), where applicable.

### 3.2 SOIL SAMPLING

Three hundred fifty-three soil samples were collected and screened for metals on site using a NITON™ XRF spectrometer. All soil samples also were screened for VOCs with a hand-held photoionization detector (PID). Those soil intervals that exhibited significant readings on the hand-held PID were sampled and analyzed by the MLP for PCE, 1,1,1-TCA, and TCE. Replicate samples were collected for laboratory confirmation samples, field duplicate samples, and matrix spike and matrix spike duplicate (MS/MSD) samples. Soil samples were collected in the vicinity of the potential source areas, from areas that exhibited high soil gas detections, and to establish background concentrations (see Appendix A, Figure 3).

Four potential source areas were divided into grids: the scrap storage area, used oil and empty barrel storage area, raw product storage area, and hazardous waste storage area D. The grids consisted of 50-by 50-foot sections. Each grid was examined for visible staining, and in the absence of such staining, a central location in each section was chosen to collect a soil sample. Most grids did not have any visible staining. The soil samples from the grid sections of the site were collected from 0-to 2- feet bgs and 2 to 4 feet bgs. Forty soil samples were collected from the scrap storage area. Ninety-four soil samples were collected from the used oil and empty barrel storage area. Four additional soil samples were collected in the used oil and empty barrel storage area to delineate and confirm the detections of lead via XRF screening. Sixteen soil samples were collected from both hazardous waste storage area D and the raw product storage area.

The remaining potential source area soil samples were collected in and around their designated areas from various depths and intervals. Soil samples were collected from hazardous waste storage areas A, B, and C and from the storm water drainage ditches. These soil samples were collected at intervals of 0 to 2 feet bgs and 2 to 4 feet bgs. Eight soil samples were collected from both hazardous waste storage areas A and B. Eighteen soil samples were collected from hazardous waste storage area C. Sixteen soil samples were collected along the two storm water drainage ditches. Six soil samples were collected in the eastern-most storm water drainage ditch, and 10 were collected in the western-most storm water drainage ditch.

Soil samples were collected from 0 to 2 feet bgs, 4 to 6 feet bgs, and 6 to 10 feet bgs in and around the scrap metal pad area and from within the burn pit area. Twenty-four soil samples were collected from the scrap metal pad, and 12 soil samples were collected from the burn pit area.

Soil samples were collected from 0 to 2 feet bgs, 2 to 6 feet bgs, 6 to 10 feet bgs, and 10 to 14 feet bgs in areas surrounding the external edges of the solvent recycling and paint mixing area, inside the galvanizing building downgradient of the metal finishing dip tanks and zinc tank, along the northern and eastern side of the surface impoundment, and in background locations. Sixteen soil samples were collected in close proximity to the exterior of the solvent recycling and paint mixing building. The proposed locations inside the solvent recycling building were inaccessible with a Geoprobe™; therefore, the sampling locations were moved outside the building. Thirty-two samples were proposed for collection inside the galvanizing building; however, only 10 were collected. Many of the proposed sample locations were located in the bottoms of the metal finishing dip tank sumps and the bottom of the zinc tank sump. However, the bottom of each of the metal finishing dip tank sumps was filled with an 8-inch layer of cement and an undetermined thickness of fire brick. A sampler was driven 12 inches into the fire brick before a decision was made to move the sample locations outside the sumps. The bottom of the zinc tank was lined only with fire brick; no cement was encountered during the coring. One layer of the fire brick was cored and removed. Upon core removal, the sampling team noticed that molten liquid zinc had apparently leaked through the cracks between the fire bricks (see Appendix C, photograph 30) and formed a solid layer of zinc that could not be penetrated with the Geoprobe™. Two sampling points were moved a few feet downgradient of both the metal finishing dip tank sumps and the zinc tank sump. Groundwater was encountered at 10 feet bgs downgradient of the metal finishing dip tanks and at 6 feet bgs downgradient of the zinc tank in borehole 3. Soil sampling was terminated at those respective

depths. In borehole 4, downgradient of the zinc tank, refusal was encountered just above 6 feet bgs. Twenty-four soil samples were collected along the protective fence to the north and east of the surface impoundment. Sixteen soil samples were collected south of "D" Street and west of the surface impoundment to provide background soil concentrations.

Four soil samples were collected from boreholes adjacent to soil gas boreholes 5, 6, 12, and 18. Soil gas samples from these locations contained the highest concentrations of VOCs in this medium. Soil samples were collected from these locations for off-site analysis to provide laboratory confirmation data for VOCs.

All of the soil samples were placed in coolers with enough ice to ensure that the temperature of the samples did not exceed 4 °C. Laboratory confirmation samples were shipped to Columbia Analytical Services laboratory in Rochester, New York, on January 16, 22, and 23, 2002. The soil samples were submitted for analysis of VOCs by EPA SW-846 Methods 8260/5035 and for metals by EPA SW-846 Method 6010B. The samples and chain-of-custody records were received by Mr. Mark Wilson upon sample delivery.

### 3.3 GEOPROBE™ TEMPORARY WELL SAMPLING

Geoprobe™ temporary well samples were collected from 15 points. Replicate samples were collected as laboratory confirmation samples, field duplicate samples, and matrix spike/ matrix spike duplicate (MS/MSD) samples. Geoprobe™ temporary well samples were generally collected downgradient of two potential source areas (surface impoundment and the galvanizing building) (see Appendix A, Figure 4). Four Geoprobe™ temporary well samples were collected downgradient of the surface impoundment to the north and east. Five Geoprobe™ temporary well samples were collected downgradient of the metal finishing dip tanks, spent acid holding pit, and zinc tank at the galvanizing building. The QAPP specified that six Geoprobe™ temporary well samples were to be collected in this area; however, only five were collected because difficulties were encountered during the concrete coring. Two Geoprobe™ temporary well samples located south of "D" Street and two Geoprobe™ temporary well samples located west of the surface impoundment were collected to provide background information. Two additional Geoprobe™ temporary well samples were collected to provide additional site information. These samples were located in the northeastern corner of the scrap storage area and the southeastern corner of

the used oil and empty barrel storage area. At each Geoprobe™ temporary well location, samples were collected at a depth near the water table, typically from 6 to 19 feet bgs. Samples were collected by advancing a disposable well screen, 4 feet in length, to the desired depth. A protective sleeve was then retracted, allowing formation water to enter the screen. Samples were collected using a peristaltic pump and disposable polyethylene tubing.

Geoprobe™ temporary well samples were placed in coolers with enough ice to maintain the temperature of the samples at or below 4 °C. Geoprobe™ temporary well samples collected for off-site analysis were shipped to Columbia Analytical Services laboratory in Rochester, New York, on January 16, 22, and 23, 2002. The Geoprobe™ temporary well samples submitted were analyzed for VOCs, total metals, and dissolved metals by EPA SW-846 Methods 8260, 6010B, and 6020, respectively. The samples and chain-of-custody records were received by Mr. Mike Wilson upon sample delivery. All groundwater samples were also analyzed for PCE, 1,1,1-TCA, and TCE by MLP. The PCE, 1,1,1-TCA, and TCE data from MLP were used to ensure that the extent of PCE, 1,1,1-TCA, and TCE in groundwater had been adequately defined prior to demobilizing from the site.

### **3.4 MONITORING WELL, PRIVATE WELL, AND MUNICIPAL WELL SAMPLING**

Groundwater samples were collected from 23 monitoring wells at or near the Agromac-Lockwood site (see Appendix A, Figure 4). Twenty-two of the monitoring wells are located on site. Monitoring well RF-5 is located in the south-central portion of the scrap storage area. Monitoring wells RF-1 and RF-2 are located in the middle of the eastern side of the used oil and empty barrel storage area. Monitoring well RF-3 is located in the eastern half of hazardous waste storage area C. Monitoring wells LW-2 and RF-4 are located in the northeastern corner of the raw product storage area just west of hazardous waste storage area B. Monitoring wells M-1, M-2, M-3, M-4, M-5, M-6, M-7, and MI-2 circle the surface impoundment. Monitoring wells LW-1, LW-3, LW-4, LW-5, LW-6, LW-7, and LW-8 are scattered across the site. Monitoring well M-8 is located off site, to the west of the surface impoundment on the adjacent property.

Prior to purging, the water levels in all monitoring wells were measured using a Slope™ water level indicator, and the measurements were recorded in the field logbook. The record of these water level measurements is provided as Appendix F. The water level data were used to produce a potentiometric

surface map, as shown in Appendix A, Figure 4. This map indicates that the on-site groundwater flows to the northeast. This flow is very similar to the groundwater gradients noted during previous groundwater sampling events. Three casing volumes were purged from each monitoring well before sampling, using either a peristaltic pump or a submersible Grundfos™ or Envirotech™ pump. Field parameters (pH, conductivity, temperature, and turbidity) were recorded during well purging to document groundwater stabilization. Samples were collected using disposable polyethylene bailers.

Thirteen well samples were collected from 11 private residences and two businesses that were analyzed on site for PCE, 1,1,1-TCA, and TCE, using the MLP (see Appendix A, Figure 5). Those 13 wells were within 1 mile of the site. Samples OS-PW-10, OS-PW-11, and OS-PW-12 were collected from residential wells located approximately 100 feet east of the used oil and empty drum storage area. Sample OS-PW-8 is from a business private well approximately 125 feet north of the scrap storage area. The wells were purged for a minimum of 5 minutes using the existing pump, then samples were collected from the spigots. One off-site lawn and garden well sample (OS-PW-7) did not have a working pump. Approximately three casing volumes were removed from this well using a peristaltic pump. Field parameters (pH, conductivity, temperature, and turbidity) were recorded during well purging to document groundwater stabilization.

A groundwater sample was collected from Gering municipal well 6 and analyzed on site for VOCs using the MLP. This well is located approximately 150 feet west of the site (see Appendix A, Figure 4). Municipal well 6 was pumped for 5 minutes (purging 5,000 gallons according to City of Gering employee Tim O'Neal) before a sample was collected from the spigot. Field parameters (pH, conductivity, temperature, and turbidity) were recorded during well purging to document groundwater stabilization.

Monitoring well, private well, and municipal well samples were placed in coolers with enough ice to maintain the temperature of the samples at or below 4 °C. Laboratory confirmation samples were shipped to Columbia Analytical Services in Rochester, New York, on January 16, 22, and 23, 2002. The monitoring well samples submitted were analyzed for VOCs, total metals, and dissolved metals by EPA SW-846 Methods 8260, 6010B, and 6020, respectively. The municipal well and private wells sampled were analyzed for VOCs by EPA Method 524.2. Those well samples were also analyzed for total metals and dissolved metals by EPA SW-846 Methods 6010B and 6020, respectively. The samples and chain-



of-custody records were received by Mr. Mark Wilson upon sample delivery. All well samples were also analyzed for PCE, 1,1,1-TCA, and TCE in the MLP. The PCE, 1,1,1-TCA, and TCE data from the MLP was used to ensure that the extent of PCE, 1,1,1-TCA, and TCE in groundwater had been defined prior to demobilizing from the site.

### 3.5 SLUDGE AND WASTEWATER SAMPLING

Nine sludges and two wastewater samples were collected (see Appendix A, Figure 6). A description of the sludges is provided in Appendix G. Replicate samples were collected as confirmation samples, field duplicate samples, and MS/MSD samples. Sludge samples were collected from the sumps adjacent to the scrap metal pad area and hazardous waste storage area C, the septic tank west of the salvage/waste storage building, stored beta acid crystals, precipitate on the exterior of the beta acid crystal sacks, the bottom of three metal finishing dip tank sumps, and backfill within the former zinc tank sump. Sludge samples also were to be collected from the sumps adjacent to hazardous waste storage areas A and B; however, the samples were not collected because the sumps had been backfilled with concrete.

Wastewater samples were collected from the sumps adjacent to the scrap metal pad area and hazardous waste storage area C. Wastewater samples were to be collected from the septic tank west of the salvage and waste storage building and from the sumps adjacent to hazardous waste storage areas A and B; however, water was not present in these areas.

Sludge and wastewater samples were placed in coolers with enough ice to maintain the temperature of the samples at or below 4 °C. Sludge and wastewater samples were shipped to Columbia Analytical Services laboratory in Rochester, New York, on January 22, 2002. The sludge samples were submitted for analysis of VOCs, total metals, and toxicity characteristic leaching procedure (TCLP) metals. VOCs and metals analyses were performed adhering to EPA SW-846 Methods 8260 and 6010B, respectively. The TCLP extractions were performed by EPA method 1311. Sludge and wastewater samples were also analyzed for pH. One sludge sample (MTS-GB-SLU-3) and one wastewater sample (SMWB-WW) were also analyzed for TPH by EPA Method 418.1 because of their oily appearance. The wastewater samples were analyzed for VOCs, total metals, and dissolved metals by EPA SW-846 Methods 8260, 6010B, and 6020, respectively. The samples and chain-of-custody records were received by Mr. Mark Wilson upon sample delivery. All sludge and wastewater samples were also analyzed for PCE, 1,1,1-TCA, and TCE

in the MLP. The VOC data from the MLP was used to ensure that the extent of VOC contamination had been defined prior to demobilizing from the site.

### 3.6 SOIL GAS SAMPLING

Soil gas samples were collected from 31 points. Replicate samples were collected as field duplicate samples and MS/MSD samples. Soil gas samples were collected in the vicinity of the potential source areas and at designated points across the site (see Appendix A, Figure 7). Eight soil gas samples were collected near the sewer line on the western half of the property. Two soil gas samples were collected near each of the following potential source areas: raw product storage, scrap metal pad, solvent recycling and paint mixing, hazardous waste storage area C, and hazardous waste storage area D. One soil gas sample was collected near each the following potential source areas: galvanizing building, storm water drainage ditch, septic tank, used oil and empty drum storage, hazardous waste storage area A, and hazardous waste storage area B. Four soil gas samples were collected from boreholes strategically placed around the exterior of the manufacturing building. Two soil gas samples were collected east of the surface impoundment along the fence, and one soil gas sample was collected to the west of the surface impoundment also near the fence.

Soil gas samples were generally collected from depths about 2 feet above the water table, typically from 6 to 19 feet bgs. Soil gas samples were collected by driving Geoprobe™ rods to the required sampling depth and then pulling up the rods 1 foot to deploy the expendable tip. A threaded adaptor attached to disposable polyethylene tubing was then threaded into an expendable point holder on the end of the Geoprobe™ rods. Next, the soil gas sample was collected from the open space below the expendable point holder by drawing a vacuum on the polyethylene tubing with a vacuum pump mounted on the Geoprobe™. Field samplers purged 5 liters of soil gas through the attached glass sample bulbs prior to sample collection, as measured by a gauge on the vacuum pump.

No laboratory confirmation samples were proposed in the QAPP for soil gas sampling. The soil gas sampling was intended as a screening tool to locate potential source areas of PCE, 1,1,1-TCA, and TCE in soil. At sample locations exhibiting elevated PCE, 1,1,1-TCA, and TCE concentrations in soil gas, the Geoprobe™ was used to collect soil samples for confirmation analysis at the off-site laboratory. Soil samples SG-5-CON-14, SG-6-CON-12, SG-12-CON-12, and SG-18-CON-11 were collected for off-site

analysis by EPA SW-846 Method 8260/5035 at the Columbia Analytical Services laboratory. These soil samples were submitted on January 23, 2002. The locations of these confirmation soil samples are shown in Appendix A, Figure 3.

### 3.7 DRUM INVENTORY AND HAZARD CATEGORIZATION

The QAPP stated that an inventory of the chemicals abandoned in the chemical storage area would be performed. Agromac representatives indicated that these chemicals, along with the beta acid crystals stored on site, were to be sold. These representatives subsequently provided an inventory, which they prepared. A copy of this inventory is provided as Attachment 6. A reconnaissance of the site was conducted to look for additional drums that contained unidentified wastes. Four unlabeled drums were found. The locations of these drums are shown in Appendix A, Figure 6. Tetra Tech START sampled these four drums and performed hazard categorization (HazCat) tests on the wastes. The results of the HazCat testing are provided as Appendix H. Preliminary indications suggested that drums 1 and 2 contained waste oil and drum 4 contained gasoline. The contents of drum 3 were not readily identified.

### 3.8 QUALITY ASSURANCE SAMPLING

To ensure that the decontamination procedures were adequate, Tetra Tech START collected equipment or rinsate blank samples of the Geoprobe™ soil, groundwater, and soil gas sampling equipment and soil sieves. A soil gas rinsate blank was prepared by drawing clean ambient air through the soil gas sampler and tubing into a soil gas bulb for analysis in the MLP. The rinsate blank samples from the groundwater and soil sampling equipment were collected at the conclusion of Geoprobe™ sampling activities using distilled water and were submitted to the off-site laboratory and the MLP for analysis.

Tetra Tech START also collected field duplicate samples for each matrix at the rate of 1 per 10 original samples, which were submitted to the MLP and the off-site laboratory for analysis. The field duplicate samples were collected to assess the comparability of data generated during the project. Water trip blank samples prepared by the Columbia Analytical Services laboratory were submitted with the environmental samples sent to the laboratory for analysis of VOCs. The trip blanks were submitted to assess whether any cross-contamination of samples had occurred during shipment.

No contaminants of concern were reported in the rinsate or trip blank samples by either the MLP or Columbia Analytical Services laboratory, with the exception of chloroform. Chloroform was reported in the rinsate samples at minimal concentrations. The distilled water used during the collection of the samples is suspected to have contained chloroform. Chloroform is commonly formed during the disinfection process of drinking water treatment. The results of field duplicate pairs were reviewed to assess comparability. Almost all field duplicate results performed by the confirmation laboratory and the MLP met the criteria for good comparability. Good comparability is considered to be a relative percent difference (RPD) of less than 67. The following results did not meet the criteria for good comparability. The dissolved zinc in groundwater samples OS-PW-01 and OS-PW-01FD had only fair comparability. Fair comparability is defined as an RPD of 68 to 167. The comparability of manganese results for sludge samples MTS-GB-SLU-2 and MTS-GB-SLU-2-FD was also considered to be fair. The total metals results from Geoprobe™ temporary well samples SI-GGW-3 and SI-GGW-3-FD showed poor comparability. Poor comparability is considered to be an RPD greater than 168. The results of SI-GGW-3-FD were consistently much higher for all metals, suggesting a matrix effect introduced by variations in the sediment content of the two split samples.

The results of the MS/MSD analyses performed by the MLP and the confirmation laboratory were generally within acceptable limits. Those results that were outside acceptable limits have been appropriately flagged in the analytical results tables. The most frequently noted cause of poor matrix spike recovery was a high initial concentration of the analyte in the spiked sample, relative to the spiked level.

A performance evaluation (PE) sample was purchased from a commercial vendor and submitted as a double blind sample to the Columbia Analytical Services laboratory for analysis. This PE sample was submitted for analysis for total metals analysis by EPA SW-846 Method 6010B and for VOCs in drinking water by EPA Method 524.2. Tables 1 and 2 list the metals and VOC concentrations reported by the Columbia Analytical Services laboratory for OS-PW-9 and the acceptable performance ranges and certified values provided by Environmental Resource Associates (see Attachment 7). Columbia Analytical Services reported results for sample OS-PW-9 that were within the acceptable ranges for all metals and VOCs in the PE sample. The vendor that prepared and certified the concentrations in the PE sample specified the acceptable ranges for each compound.

TABLE 1

OFF-SITE PERFORMANCE EVALUATION  
SAMPLE RESULTS AND JUDGEMENT CRITERIA FOR METALS  
AGROMAC-LOCKWOOD, OPERABLE UNIT 2 - GERING, NEBRASKA  
(VALUES REPORTED IN MICROGRAMS PER LITER)

Metal	Reported Concentration	Certified Value	Acceptable Performance Range
Arsenic	112	101	82.6 - 120
Barium	1040	941	800 - 1080
Cadmium	17.9	17.4	14.2 - 20.4
Chromium	81.3	75.9	63.4 - 87.3
Lead	14.2	13.8	11.1 - 16.7
Manganese	75.2	70.3	61.2 - 78.0
Mercury	6.00	7.08	4.96 - 9.20
Selenium	57.7	63.7	48.8 - 77.7
Silver	184	172	144 - 200
Zinc	573	544	462 - 651

TABLE 2

**OFF-SITE PERFORMANCE EVALUATION SAMPLE RESULTS AND JUDGEMENT  
CRITERIA FOR VOLATILE ORGANIC COMPOUNDS  
AGROMAC-LOCKWOOD, OPERABLE UNIT 2 - GERING, NEBRASKA  
(VALUES REPORTED IN MICROGRAMS PER LITER)**

Volatile Organic Compound	Reported Concentration	Certified Value	Acceptable Performance Range
Benzene	12.0	12.1	9.68 - 14.5
Carbon tetrachloride	16.0	17.5	14.0 - 21.0
Chlorobenzene	39.0	41.3	33.0 - 49.6
1,2-Dichlorobenzene	7.70	7.84	4.70 - 11.0
1,4-Dichlorobenzene	10.0	10.6	8.48 - 12.7
1,2-Dichloroethane	7.70	7.38	4.43 - 10.3
1,1-Dichloroethene	15.0	15.8	12.6 - 19.0
trans-1,2-Dichloroethene	27.0	28.4	22.7 - 34.1
cis-1,2-Dichloroethene	42.0	44.3	35.4 - 53.2
1,2-Dichloropropane	14.0	15.4	12.3 - 18.5
Ethylbenzene	8.30	8.42	5.05 - 11.8
Methylene chloride	7.00	6.75	4.05 - 9.45
Styrene	12.0	13.4	10.7 - 16.1
Tetrachloroethene	4.10	4.42	2.65 - 6.19
Toluene	4.60	4.82	2.89 - 6.75
1,2,4-Trichlorobenzene	14.0	16.8	13.4 - 20.2
1,1,1-Trichloroethane	8.40	9.51	5.71 - 13.3
1,1,2-Trichloroethane	8.50	9.38	5.63 - 13.1
Trichloroethene	16.0	17.8	14.2 - 21.4
Vinyl chloride	16.0	17.2	10.3 - 24.1
Meta & Para-xylenes	7.70	7.79	4.67 - 10.9
Ortho-xylenes	5.80	5.95	3.57 - 8.33

### 3.9 INVESTIGATION-DERIVED WASTE

Investigation-derived waste (IDW) was segregated and containerized according to waste type: expendable equipment, soil, and water. Tetra Tech START disposed of expendable equipment IDW as municipal solid waste. Soil IDW was negligible because the samplers removed a low volume of soil, which was needed to fill the required sample jars. Any soil that remained after sampling was returned to the sampling areas. Water IDW consisted of decontamination water, purge water from the Geoprobe™ temporary wells and monitoring wells, and minimal sample water from the MLP. Water IDW was returned to the areas of sampling. Water IDW generated while purging on-site monitoring wells was collected in drums provided by Agromac. These drums are currently staged beside each well. Agromac has agreed to dispose of this purge water upon the EPA's approval.

## 4.0 SUMMARY OF ANALYTICAL RESULTS

Tetra Tech START conducted environmental sampling during the RA to continue to define contaminated areas of soil and groundwater. Specifically, soil; groundwater from Geoprobe™ temporary wells, monitoring wells, private wells, and the municipal well; sludge; wastewater; and soil gas samples were collected from potential source areas and background locations. To interpret the analytical results and determine significant matrix contaminant levels, RA sample results were compared to applicable health-based benchmarks such as EPA Region 9 PRGs and EPA MCLs. The results from the on-site and off-site analyses are summarized in tables in the following sections. All health-based standards used for data comparison are specified on each appropriate table.

### 4.1 METALS IN SOIL AND SLUDGE

Three hundred sixty-two soil and sludge samples were screened on site using a NITON™ XRF spectrometer (these were: on-site results) for the eight RCRA metals plus manganese, molybdenum, nickel, and zinc. The on-site metals in soil and sludge screening results have been included in Table 3. Of the 362 samples analyzed on site, 59 were submitted to Columbia Analytical Services laboratory in Rochester, New York, for confirmation analysis (these were: off-site results). The confirmation samples were analyzed for the RCRA metals plus manganese and zinc by EPA SW-846 Methods 6010B and 7470A. Analytical data packages for the Columbia Analytical Services laboratory results are provided as

Attachment 8. A summary of the off-site results for metals in soil and sludge samples is included as Table 4. The results in the summary tables that exceeded their respective PRGs have been highlighted with gray. PRGs were used for comparison purposes because the state of Nebraska has no established cleanup guidelines. Zinc and lead were the only metals detected by on-site analysis and confirmed by off-site analysis to be above their respective PRGs. Figure 8 displays soil and sludge sample collection points and areas. It also displays confirmation sample results for metals that exceed their respective PRGs.



TABLE 3

ON-SITE METALS CONCENTRATIONS IN SOIL AND SLUDGE,  
ANALYTICAL RESULTS SUMMARY  
AGROMAC-LOCKWOOD, OPERABLE UNIT 2 – GERING, NEBRASKA  
RESULTS REPORTED IN MILLIGRAMS PER KILOGRAM

Sample Number	PRG	Arsenic	Barium	Cadmium	Chromium	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
		440	100000	810	450	750	32000	610	10000	41000	10000	10000	100000
BA-S-1-0/2		ND	605	<58.0	<510	<34.0	ND	<21.0	ND	ND	<19.0	<280	<67.0
BA-S-1-2/6		ND	658	<58.0	<510	<28.0	<910	<19.0	ND	ND	ND	<280	<74.0
BA-S-1-6/10		<35.0	638	<49.0	<520	<33.0	ND	<24.0	ND	ND	ND	<280	<70.0
BA-S-2-0/2		<31.0	546	<53.0	<520	<31.0	<940	<21.0	ND	ND	ND	<300	<68.0
BA-S-2-2/6		ND	662	<58.0	<540	38.6	<930	ND	ND	ND	ND	<280	<76.0
BA-S-2-6/10		<30.0	742	<40.0	ND	36.4	<870	<20.0	ND	ND	ND	<280	80.6
BA-S-3-0/2		ND	694	<57.0	<510	<34.0	ND	<21.0	ND	ND	ND	<300	109
BA-S-3-2/6		ND	604	<50.0	<480	<32.0	ND	<21.0	ND	ND	ND	<280	<70.0
BA-S-3-6/10		<31.0	845	<53.0	<570	<33.0	ND	ND	ND	ND	ND	<280	143
BAC-SLU		<96.0	<38.0	<82.0	<3600	ND	ND	<160	ND	ND	ND	<430	<17000
BP-S-1-0/2		ND	675	<51.0	<510	59.4	<910	<23.0	ND	ND	ND	<300	232
BP-S-1-2/6		ND	592	<42.0	<640	<36.0	<1100	ND	ND	ND	ND	<240	<77.0
BP-S-1-6/10		ND	682	<55.0	<550	<30.0	<960	ND	ND	ND	ND	<330	<76.0
BP-S-2-0/2		ND	743	<45.0	<490	56.8	ND	ND	ND	ND	<18.0	<280	261
BP-S-2-2/6		<37.0	544	<60.0	<610	<37.0	ND	ND	ND	ND	ND	<300	<82.0
BP-S-2-6/10		<31.0	914	<48.0	<550	<31.0	ND	<24.0	ND	ND	ND	<280	<74.0
BP-S-3-0/2		ND	518	<52.0	<520	34.0	<930	ND	ND	ND	ND	<300	247
BP-S-3-2/6		<32.0	719	<52.0	<520	<312	ND	<24.0	ND	ND	ND	<300	<77.0
BP-S-3-6/10		ND	866	<50.0	<580	<34.0	ND	<25.0	ND	ND	ND	<300	<75.0
BP-S-4-0/2		ND	461	<65.0	<810	45.5	<1600	ND	ND	ND	<22.0	<310	378
BP-S-4-2/6		<33.0	653	<56.0	<610	<33.0	ND	<24.0	ND	ND	ND	<280	<76.0
BP-S-4-6/10		ND	803	<33.0	<630	<34.0	<1100	ND	ND	ND	ND	<180	90.4
GBS-S-1-0/2		<28.0	680	<46.0	ND	<26.0	<520	<19.0	ND	ND	ND	<270	<64.0
GBS-S-1-10/14		<34.0	922	<45.0	<570	<33.0	<910	ND	ND	ND	ND	<300	<77.0
GBS-S-1-2/6		<32.0	580	<51.0	<450	<31.0	ND	<20.0	ND	ND	<19.0	<300	<66.0
GBS-S-1-6/10		<32.0	594	<61.0	<480	<30.0	ND	ND	ND	ND	<21.0	<300	129
GBS-S-2-0/2		<27.0	621	<47.0	<460	<28.0	<520	<21.0	ND	ND	<18.0	<280	<63.0
GBS-S-2-10/14		ND	782	<46.0	<570	<32.0	ND	<23.0	ND	ND	ND	<310	<74.0
GBS-S-2-2/6		ND	784	48.0	<420	<30.0	ND	<21.0	ND	ND	ND	270	<72.0
GBS-S-2-6/10		ND	644	<49.0	<480	<32.0	ND	<22.0	ND	ND	<19.0	<270	407
GBS-S-3-0/2		<32.0	651	<46.0	<400	<32.0	ND	ND	ND	ND	<19.0	<280	90.1
GBS-S-3-10/14		ND	970	<48.0	<550	<36.0	ND	ND	13.3	ND	<21.0	<280	122
GBS-S-3-2/6		<28.0	576	<39.0	<360	<25.0	ND	<21.0	ND	ND	ND	<270	369
GBS-S-3-6/10		ND	841	<55.0	ND	<34.0	ND	<22.0	ND	ND	<19.0	<330	357
GBS-S-4-0/2		<31.0	695	<53.0	<400	<30.0	ND	27.8	ND	ND	ND	<270	1710
GBS-S-4-2/4		ND	692	<43.0	ND	<32.0	<580	<23.0	ND	ND	<21.0	<270	967
HWSA-S-1-0/2		<34.0	435	<56.0	<580	<32.0	<1000	ND	ND	ND	ND	<310	<74.0
HWSA-S-1-2/4		<33.0	485	<50.0	<570	ND	<930	<23.0	ND	ND	ND	<280	<73.0
HWSA-S-2-0/2		<35.0	496	<37.0	ND	<31.0	ND	<22.0	ND	ND	ND	<310	114
HWSA-S-2-2/4		34.0	436	<57.0	ND	<28.0	<970	<23.0	ND	ND	ND	<300	81.0
HWSA-S-3-0/2		<31.0	435	<60.0	<520	<31.0	ND	ND	ND	ND	ND	<310	<78.0
HWSA-S-3-2/4		ND	571	<46.0	<550	<31.0	ND	ND	ND	ND	<20.0	<300	<71.0

TABLE 3 (Continued)

ON-SITE METALS CONCENTRATIONS IN SOIL AND SLUDGE,  
ANALYTICAL RESULTS SUMMARY  
AGROMAC-LOCKWOOD, OPERABLE UNIT 2 – GERING, NEBRASKA  
RESULTS REPORTED IN MILLIGRAMS PER KILOGRAM

Sample Number	Arsenic	Barium	Cadmium	Chromium	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
PRG	440	100000	810	450	750	32000	610	10000	41000	10000	10000	100000
HWSA-S-4-0/2	ND	517	<40.0	<580	<31.0	<960	<21.0	ND	ND	ND	<300	<80.0
HWSA-S-4-2/4	<31.0	389	<40.0	<480	<30.0	ND	ND	ND	ND	ND	<300	<70.0
HWSB-S-1-0/2	<33.0	550	<48.0	ND	<31.0	<970	ND	ND	ND	ND	<310	135
HWSB-S-1-2/4	<32.0	440	<45.0	<580	ND	ND	ND	ND	ND	<20.0	<310	115
HWSB-S-2-0/2	ND	525	<57.0	<900	292	<1800	ND	ND	ND	ND	<330	1410
HWSB-S-2-2/4	ND	526	<56.0	<550	<33.0	ND	<23.0	ND	ND	ND	<310	<73.0
HWSB-S-3-0/2	<37.0	592	<55.0	ND	37.5	<1300	<24.0	ND	ND	ND	<340	103
HWSB-S-3-2/4	<34.0	430	<45.0	<520	<32.0	ND	<23.0	ND	ND	ND	<300	<75.0
HWSB-S-4-0/2	<39.0	569	<58.0	<510	55.8	ND	<24.0	ND	ND	ND	<310	116
HWSB-S-4-2/4	<31.0	410	<52.0	<510	<29.0	ND	<21.0	ND	ND	ND	<300	<73.0
HWSC-S-1-0/2	ND	570	<40.0	<670	144	ND	<40.0	ND	ND	ND	<310	8540
HWSC-S-1-2/4	<34.0	659	<47.0	<550	<32.0	ND	37.8	ND	<250	ND	<250	3780
HWSC-S-2-0/2	<37.0	556	<51.0	<660	<35.0	ND	ND	ND	384	ND	<310	4390
HWSC-S-2-2/4	ND	706	<46.0	<630	<35.0	ND	<33.0	ND	433	ND	<300	6200
HWSC-S-3-0/2	ND	741	<57.0	<610	<35.0	ND	ND	ND	ND	ND	<300	3530
HWSC-S-3-2/4	ND	703	<52.0	<480	51.6	ND	<21.0	ND	ND	ND	<250	471
HWSC-S-4-0/2	<38.0	609	<59.0	<690	<34.0	ND	<42.0	ND	427	ND	<330	11.4
HWSC-S-4-2/4	ND	692	<50.0	<540	<35.0	ND	36.7	ND	<270	<21.0	<300	3090
HWSC-S-5-0/2	ND	534	<42.0	<660	220	ND	ND	ND	<330	<24.0	<280	7850
HWSC-S-5-2/4	<32.0	623	<45.0	ND	<30.0	ND	ND	ND	ND	<21.0	<300	180
HWSC-S-6-0/2	ND	420	<56.0	<1500	587	ND	384	ND	2910	ND	<310	160000
HWSC-S-6-2/4	<34.0	628	<51.0	<550	<33.0	ND	ND	ND	ND	ND	<280	3220
HWSC-S-7-0/2	ND	526	<51.0	ND	157	<1200	<42.0	ND	367	ND	<300	12,500
HWSC-S-7-2/4	ND	624	<56.0	<580	<30.0	ND	34.2	ND	ND	<21.0	<280	2990
HWSC-S-8-0/2	ND	615	<53.0	<580	87.6	<1000	<30.0	ND	ND	ND	<280	3660
HWSC-S-8-2/4	ND	774	<47.0	<550	<31.0	ND	ND	ND	ND	ND	<220	214
HWSC-S-9-0/4	<35.0	594	<49.0	<540	<35.0	ND	<26.0	ND	ND	ND	<310	553
HWSC-SLU	<50.0	586	<57.0	ND	ND	169	ND	<34.0	ND	<19.0	<270	6410
HWSD-S-A1-0/2	ND	921	<49.0	<570	<32.0	<990	<22.0	ND	ND	ND	<300	<72.0
HWSD-S-A1-2/4	<35.0	776	<54.0	<610	<34.0	ND	<24.0	ND	ND	<21.0	<300	<76.0
HWSD-S-A2-0/2	<34.0	886	<51.0	<610	<35.0	ND	<24.0	ND	ND	ND	<310	136
HWSD-S-A2-2/4	ND	929	<51.0	<600	<36.0	<1000	ND	ND	ND	ND	<300	ND
HWSD-S-A3-0/2	ND	792	<56.0	ND	<35.0	<970	ND	ND	ND	<19.0	<340	136
HWSD-S-A3-2/4	<32.0	854	<57.0	<610	<31.0	<1000	ND	ND	ND	ND	<300	<74.0
HWSD-S-A4-0/2	ND	552	<55.0	<540	<43.0	<960	ND	ND	ND	<20.0	<300	83.9
HWSD-S-A4-2/4	ND	612	<59.0	<540	<34.0	<930	ND	ND	ND	ND	<300	<76.0
HWSD-S-B1-0/2	<36.0	749	<40.0	<580	<32.0	ND	ND	ND	ND	ND	<300	191
HWSD-S-B1-2/4	ND	894	<46.0	<580	<34.0	ND	ND	ND	ND	ND	<310	<79.0
HWSD-S-B2-0/2	<34.0	886	<64.0	<600	<33.0	ND	<22.0	ND	ND	ND	<330	<76.0
HWSD-S-B2-2/4	<34.0	727	<56.0	<570	<31.0	<1000	<24.0	ND	ND	ND	<300	99.9
HWSD-S-B3-0/2	ND	670	<50.0	ND	<35.0	<960	ND	ND	ND	<21.0	<300	764
HWSD-S-B3-2/4	ND	702	<50.0	<540	40.1	ND	<20.0	ND	ND	<21.0	<310	<71.0

TABLE 3 (Continued)

ON-SITE METALS CONCENTRATIONS IN SOIL AND SLUDGE,  
ANALYTICAL RESULTS SUMMARY  
AGROMAC-LOCKWOOD, OPERABLE UNIT 2 – GERING, NEBRASKA  
RESULTS REPORTED IN MILLIGRAMS PER KILOGRAM

Sample Number	Arsenic	Barium	Cadmium	Chromium	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
PRG	440	100000	810	450	750	32000	610	10000	41000	10000	10000	100000
HWSD-S-B4-0/2	ND	651	<58.0	<600	46.9	<990	<22.0	ND	ND	ND	<300	115
HWSD-S-B4-2/4	ND	777	<45.0	<580	<31.0	<960	ND	ND	ND	ND	<300	<75.0
Metallic	ND	ND	ND	10700	24500	ND	5310	ND	48400	ND	ND	2330000
MTS-GB-SLU-1	ND	<52.0	<64.0	<1900	447	ND	117	ND	ND	ND	<330	127000
MTS-GB-SLU-2	ND	<83.0	<86.0	<3400	<90.0	ND	<294	ND	ND	ND	<460	124000
MTS-GB-SLU-3	ND	669	<86.0	<4900	410	ND	<240	ND	ND	ND	<400	145000
MTS-GB-SLU-4	ND	746	<43.0	<570	<37.0	<870	ND	ND	ND	ND	<270	<152
SEDS-S-A1-0/2	<69.0	639	<49.0	ND	<72.0	<1800	ND	ND	ND	ND	<310	1003
SEDS-S-A10-0/2	<36.0	519	<57.0	<600	41.4	ND	<23.0	ND	ND	ND	<300	437
SEDS-S-A10-2/4	ND	522	<49.0	<540	<31.0	<940	<22.0	ND	ND	ND	<270	<70.0
SEDS-S-A11-0/2	<33.0	488	<57.0	ND	37.8	<940	ND	ND	ND	ND	<310	192
SEDS-S-A11-2/4	ND	517	<51.0	ND	<32.0	ND	ND	ND	ND	<20.0	<270	87.6
SEDS-S-A1-2/4	<52.0	409	<57.0	<850	ND	ND	ND	ND	ND	<31.0	<300	260
SEDS-S-A12-0/2	ND	454	<60.0	<550	37.9	ND	ND	ND	ND	<17.0	434	119
SEDS-S-A12-2/4	<33.0	553	<50.0	ND	<32.0	<1200	ND	ND	ND	ND	<330	<78.0
SEDS-S-A13-0/2	<32.0	462	<63.0	<510	<31.0	ND	<23.0	ND	ND	ND	<280	136
SEDS-S-A13-2/4	<34.0	554	<53.0	<610	<34.0	ND	ND	ND	ND	ND	<330	<76.0
SEDS-S-A14-0/2	ND	586	<44.0	<540	69.0	<970	<26.0	ND	ND	ND	<310	1610
SEDS-S-A14-2/4	<31.0	400	<57.0	ND	<30.0	<940	<21.0	ND	ND	ND	<270	<74.0
SEDS-S-A15-0/2	ND	505	<53.0	ND	48.7	<1000	<24.0	ND	ND	ND	<300	214
SEDS-S-A15-2/4	ND	572	<52.0	<570	<33.0	<930	ND	ND	ND	ND	<300	153
SEDS-S-A2-0/2	<40.0	602	<49.0	<580	77.1	<1000	ND	ND	ND	ND	<310	1250
SEDS-S-A2-2/4	ND	420	<61.0	<520	<34.0	ND	<22.0	ND	ND	<21.0	<300	297
SEDS-S-A3-0/2	ND	616	<51.0	ND	71.3	<1200	<26.0	ND	ND	<24.0	<300	602
SEDS-S-A3-2/4	ND	435	<50.0	<960	<55.0	ND	<40.0	ND	ND	<36.0	<300	446
SEDS-S-A4-0/2	<43.0	534	<48.0	ND	93.2	<1000	ND	ND	ND	ND	<310	568
SEDS-S-A4-2/4	<31.0	452	<62.0	ND	<30.0	<970	ND	ND	ND	ND	<300	151
SEDS-S-A5-0/2	ND	551	<47.0	ND	46.0	<970	<21.0	ND	ND	ND	<300	663
SEDS-S-A5-2/4	<31.0	437	<54.0	ND	<30.0	<970	<22.0	ND	ND	ND	<280	<75.0
SEDS-S-A6-0/2	ND	614	<46.0	<550	<34.0	<990	<26.0	ND	ND	ND	<310	617
SEDS-S-A6-2/4	<31.0	482	<33.0	<540	<30.0	ND	ND	ND	ND	<20.0	<280	<78.0
SEDS-S-A7-0/2	<36.0	528	<66.0	<540	35.3	ND	ND	ND	ND	ND	<310	120
SEDS-S-A7-2/4	<31.0	460	<40.0	ND	<31.0	<870	<21.0	ND	ND	ND	<270	<73.0
SEDS-S-A8-0/2	<34.0	554	<56.0	<550	<30.0	<990	ND	ND	ND	<21.0	<310	<74.0
SEDS-S-A8-2/4	ND	443	<43.0	<550	<36.0	<960	<23.0	ND	ND	ND	<280	86.6
SEDS-S-A9-0/2	ND	646	<53.0	<570	43.5	<990	ND	ND	ND	ND	<330	157
SEDS-S-A9-2/4	<36.0	409	<40.0	<540	38.2	ND	ND	ND	ND	<21.0	<340	<72.0
SEDS-S-B1-0/2	<35.0	482	<65.0	<540	<33.0	ND	<21.0	ND	ND	ND	<330	231
SEDS-S-B1-2/4	ND	508	<55.0	<550	68.1	<970	<23.0	ND	ND	ND	<300	782
SEDS-S-B10-0/2	ND	512	<47.0	<550	42.2	ND	<23.0	ND	ND	ND	<270	627
SEDS-S-B10-2/4	ND	598	<64.0	<630	<33.0	ND	<22.0	ND	ND	ND	<330	<81.0
SEDS-S-B11-0/2	ND	593	<69.0	ND	45.7	<960	<23.0	ND	ND	ND	<310	365



TABLE 3 (Continued)

ON-SITE METALS CONCENTRATIONS IN SOIL AND SLUDGE,  
ANALYTICAL RESULTS SUMMARY  
AGROMAC-LOCKWOOD, OPERABLE UNIT 2 – GERING, NEBRASKA  
RESULTS REPORTED IN MILLIGRAMS PER KILOGRAM

Sample Number	PRG	Arsenic	Barium	Cadmium	Chromium	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
	440	100000	810	450	750	32000	610	10000	41000	10000	10000	10000	100000
SEDS-S-B11-2/4	ND	666	<50.0	<550	<35.0	ND	ND	ND	ND	20.0	<310	<73.0	
SEDS-S-B12-0/2	<30.0	568	<57.0	ND	<29.0	<900	<23.0	ND	ND	ND	<280	497	
SEDS-S-B12-2/4	<32.0	458	<56.0	<600	<30.0	<1000	ND	ND	ND	ND	<300	<75.0	
SEDS-S-B13-0/2	ND	490	<64.0	<580	<35.0	<990	<23.0	ND	ND	ND	<310	486	
SEDS-S-B13-2/4	ND	538	<48.0	<550	<35.0	ND	ND	ND	ND	<20.0	<330	<75.0	
SEDS-S-B14-0/2	<32.0	466	<46.0	<550	<32.0	ND	<22.0	ND	ND	ND	<300	196	
SEDS-S-B14-2/4	ND	539	<46.0	<580	44.7	ND	ND	ND	ND	<20.0	<330	<76.0	
SEDS-S-B15-0/2	ND	454	<42.0	<480	<33.0	ND	26.1	ND	ND	ND	<330	267	
SEDS-S-B15-2/4	<31.0	481	<54.0	<520	<31.0	ND	ND	ND	ND	ND	<300	130	
SEDS-S-B2-0/2	ND	718	<64.0	<600	65.5	<960	<27.0	ND	ND	ND	<330	1020	
SEDS-S-B2-2/4	<35.0	527	<34.0	<550	46.7	ND	ND	ND	ND	<18.0	<310	373	
SEDS-S-B3-0/2	ND	552	<40.0	<540	70.6	<970	<27.0	ND	ND	<19.0	<250	1820	
SEDS-S-B3-2/4	<34.0	665	<72.0	<540	<33.0	ND	ND	ND	ND	ND	<310	172	
SEDS-S-B4-0/2	ND	534	<46.0	<630	1140	<1100	ND	ND	ND	ND	<310	1550	
SEDS-S-B4-2/4	<120	543	<55.0	<580	1150	<1000	ND	ND	ND	ND	<340	360	
SEDS-S-B4A-0/2	<37.0	539	<42.0	ND	73.0	<940	ND	ND	ND	ND	<300	274	
SEDS-S-B4A-2/4	ND	522	<43.0	ND	<31.0	<970	<20.0	ND	ND	<19.0	<220	372	
SEDS-S-B4B-0/2	<37.0	591	<46.0	<540	52.3	ND	ND	ND	ND	<19.0	<280	553	
SEDS-S-B4B-2/4	<38.0	673	<51.0	<580	63.6	<1000	ND	ND	ND	ND	<280	368	
SEDS-S-B5-0/2	ND	635	<57.0	<580	38.2	<1000	<23.0	ND	ND	ND	<280	139	
SEDS-S-B5-2/4	<33.0	625	<70.0	<600	<35.0	ND	<21.0	ND	ND	ND	<310	136	
SEDS-S-B6-0/2	<33.0	602	<51.0	<600	<30.0	<990	ND	ND	ND	ND	<310	281	
SEDS-S-B6-2/4	<32.0	494	<58.0	<520	<32.0	ND	ND	ND	ND	ND	<300	119	
SEDS-S-B7-0/2	ND	652	<59.0	<550	48.5	ND	<20.0	ND	ND	<20.0	<300	294	
SEDS-S-B7-2/4	<31.0	642	<58.0	<660	<31.0	<1100	ND	ND	ND	ND	<330	104	
SEDS-S-B8-0/2	ND	560	<66.0	<540	47.6	ND	ND	ND	ND	<21.0	<310	185	
SEDS-S-B8-2/4	ND	628	<39.0	ND	<33.0	<880	<22.0	ND	ND	ND	<280	<72.0	
SEDS-S-B9-0/2	<32.0	582	<39.0	<580	<32.0	ND	ND	ND	ND	ND	<310	293	
SEDS-S-B9-2/4	<32.0	657	<53.0	<570	<35.0	ND	ND	ND	ND	<19.0	<310	<77.0	
SEDS-S-C1-0/2	<38.0	585	<49.0	<570	36.6	<990	ND	ND	ND	ND	<300	1000	
SEDS-S-C10-0/2	ND	529	<45.0	ND	34.7	<1000	<23.0	ND	ND	ND	<310	738	
SEDS-S-C10-2/4	<33.0	512	<46.0	<550	<31.0	ND	<23.0	ND	ND	ND	<310	<74.0	
SEDS-S-C11-0/2	ND	494	<57.0	<550	71.9	<940	ND	ND	ND	ND	<300	304	
SEDS-S-C11-2/4	ND	525	<39.0	<490	<33.0	<870	<22.0	ND	ND	ND	<250	119	
SEDS-S-C12-0/2	<32.0	409	<62.0	<550	<33.0	<1000	<23.0	ND	ND	ND	<300	134	
SEDS-S-C12-2/4	ND	509	<46.0	<550	<33.0	<940	<21.0	ND	ND	ND	<330	117	
SEDS-S-C13-0/2	<32.0	657	<41.0	ND	<31.0	<940	ND	ND	ND	ND	<310	ND	
SEDS-S-C13-2/4	<32.0	597	<65.0	<580	<29.0	<1000	<23.0	ND	ND	ND	<310	169	
SEDS-S-C14-0/2	<29.0	428	<67.0	<510	<28.0	ND	<21.0	ND	ND	ND	<310	<74.0	
SEDS-S-C14-2/4	<34.0	423	<60.0	ND	<34.0	<1000	ND	ND	ND	<19.0	<300	115	
SEDS-S-C15-0/2	<31.0	521	<43.0	<540	<30.0	<930	ND	ND	ND	ND	<300	82.0	
SEDS-S-C15-2/4	<34.0	552	<58.0	<550	<33.0	<970	ND	ND	ND	ND	<310	269	

TABLE 3 (Continued)

ON-SITE METALS CONCENTRATIONS IN SOIL AND SLUDGE,  
ANALYTICAL RESULTS SUMMARY  
AGROMAC-LOCKWOOD, OPERABLE UNIT 2 – GERING, NEBRASKA  
RESULTS REPORTED IN MILLIGRAMS PER KILOGRAM

Sample Number	PRG	Arsenic	Barium	Calcium	Chromium	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
		440	100000	810	450	750	32000	610	10000	41000	10000	10000	100000
SEDS-S-C15-2/4		<30.0	553	<36.0	<490	<30.0	ND	ND	ND	ND	<18.0	<300	82.9
SEDS-S-C2-0/2		ND	822	<55.0	<610	80.8	<1100	<28.0	ND	ND	ND	<310	1930
SEDS-S-C2-2/4		<33.0	450	<59.0	ND	<34.0	<990	ND	ND	ND	ND	<310	600
SEDS-S-C3-0/2		ND	394	<45.0	ND	<35.0	<1000	<22.0	ND	ND	ND	<300	349
SEDS-S-C3-2/4		<35.0	503	<49.0	ND	43.0	<1200	ND	ND	ND	ND	<310	1850
SEDS-S-C4-0/2		ND	649	<48.0	<540	84.5	<880	<25.0	ND	ND	ND	<310	381
SEDS-S-C4-2/4		<34.0	433	<59.0	<520	46.7	ND	ND	ND	ND	ND	<300	452
SEDS-S-C5-0/2		<43.0	593	<55.0	<540	85.8	ND	<24.0	ND	ND	ND	<300	505
SEDS-S-C5-2/4		<36.0	772	<64.0	<550	<34.0	<970	ND	ND	ND	ND	<310	454
SEDS-S-C6-0/2		ND	620	<54.0	<540	38.2	ND	<20.0	ND	ND	<19.0	<310	108
SEDS-S-C6-2/4		ND	569	<50.0	ND	48.1	<960	<23.0	ND	ND	ND	<310	125
SEDS-S-C7-0/2		ND	589	<51.0	<580	36.2	<960	ND	ND	ND	ND	<280	121
SEDS-S-C7-2/4		<30.0	655	<42.0	<520	ND	<940	ND	ND	ND	ND	<300	84.9
SEDS-S-C8-0/2		ND	578	<61.0	ND	48.0	<1000	<24.0	ND	ND	ND	<300	299
SEDS-S-C8-2/4		ND	605	<49.0	<510	<30.0	<900	ND	ND	ND	ND	<270	122
SEDS-S-C9-0/2		ND	619	<55.0	<530	<33.0	ND	<22.0	ND	ND	ND	<310	104
SEDS-S-C9-2/4		ND	534	<45.0	<550	<33.0	ND	<20.0	ND	ND	<19.0	<270	221
OS-S-1-0/2		<34.0	552	<58.0	ND	<30.0	<1000	ND	ND	ND	ND	<280	<80.0
OS-S-1-10/14		ND	746	<41.0	<550	<34.0	<960	ND	ND	ND	ND	<280	<84.0
OS-S-1-2/6		ND	776	<57.0	<570	<35.0	ND	<26.0	ND	ND	ND	<280	<80.0
OS-S-1-6/10		<32.0	763	<45.0	ND	46.7	ND	<21.0	ND	ND	<16.0	<280	<83.0
OS-S-1-6/10-FD1		ND	973	<49.0	<580	<37.0	ND	<25.0	ND	ND	ND	<310	<82.0
OS-S-1-6/10-FD2		<35.0	795	<52.0	<600	<34.0	ND	ND	ND	ND	ND	<300	<75.0
OS-S-2-0/2		<31.0	528	<49.0	<520	<30.0	ND	<20.0	ND	ND	ND	<310	78.5
OS-S-2-10/14		ND	693	<42.0	<570	<32.0	<910	<24.0	ND	ND	ND	<270	<80.0
OS-S-2-2/6		ND	787	<53.0	<520	<35.0	ND	<21.0	ND	ND	<18.0	<310	<76.0
OS-S-2-6/10		<32.0	907	<32.0	<520	<31.0	ND	ND	ND	ND	ND	<220	<67.0
OS-S-3-0/2		ND	620	<53.0	<520	<30.0	<930	ND	ND	ND	ND	<300	88.6
OS-S-3-10/14		<33.0	1050	<55.0	<540	ND	<930	<23.0	ND	ND	ND	<330	<74.0
OS-S-3-2/6		<25.0	696	<57.0	<450	<27.0	ND	<17.0	ND	ND	ND	<280	<58.0
OS-S-3-6/10		ND	1060	<50.0	<550	<32.0	ND	ND	ND	ND	<21.0	<330	<73.0
OS-S-4-0/2		<34.0	509	<47.0	<600	ND	ND	<23.0	ND	ND	<20.0	<250	82.6
OS-S-4-10/14		ND	880	<42.0	<610	<38.0	ND	<27.0	ND	ND	<23.0	<280	<81.0
OS-S-4-2/6		<34.0	636	<51.0	<600	<32.0	ND	<22.0	14.1	ND	<19.0	<280	<74.0
OS-S-4-6/10		ND	802	<45.0	<540	<32.0	ND	ND	ND	ND	ND	<280	75.0
RPS-S-A1-0/2		<32.0	504	<53.0	<550	<32.0	ND	ND	ND	ND	<19.0	<310	127
RPS-S-A1-2/4		ND	532	<49.0	<550	38.4	ND	<21.0	ND	ND	ND	<310	<71.0
RPS-S-A2-0/2		ND	545	<49.0	<630	122	<1100	<28.0	ND	ND	ND	<300	355
RPS-S-A2-2/4		<36.0	493	<64.0	<600	<35.0	<1000	ND	ND	ND	ND	<310	<81.0
RPS-S-B1-0/2		ND	604	<56.0	<550	38.5	<960	ND	ND	ND	ND	<330	103
RPS-S-B1-2/4		<30.0	519	<60.0	<520	<30.0	<960	ND	ND	ND	ND	<310	<74.0
RPS-S-B2-0/2		ND	623	<59.0	<580	<33.0	ND	ND	ND	ND	<22.0	<310	<75.0

TABLE 3 (Continued)

ON-SITE METALS CONCENTRATIONS IN SOIL AND SLUDGE,  
ANALYTICAL RESULTS SUMMARY  
AGROMAC-LOCKWOOD, OPERABLE UNIT 2 – GERING, NEBRASKA  
RESULTS REPORTED IN MILLIGRAMS PER KILOGRAM

Sample Number	Arsenic	Barium	Calcium	Chromium	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
PRG	440	100000	810	450	750	32000	610	10000	41000	10000	10000	100000
RPS-S-B2-2/4	<35.0	551	<60.0	ND	<33.0	<1100	ND	ND	ND	ND	<310	<77.0
RPS-S-C1-0/2	ND	566	<56.0	ND	131	<1100	<26.0	ND	ND	ND	<300	342
RPS-S-C1-2/4	ND	598	<65.0	<550	40.5	<1000	<21.0	ND	ND	<19.0	<280	<79.0
RPS-S-C2-0/2	<160	528	<53.0	<640	2380	ND	ND	ND	ND	ND	<310	146
RPS-S-C2-2/4	<48.0	537	<55.0	<520	149	ND	<23.0	ND	ND	ND	<300	<73.0
RPS-S-D1-0/2	<39.0	567	<49.0	<600	38.5	ND	<25.0	ND	ND	ND	<310	193
RPS-S-D1-2/4	ND	967	<47.0	<510	34.7	ND	ND	ND	ND	ND	<310	<78.0
RPS-S-D2-0/2	<36.0	705	<52.0	<510	<33.0	ND	ND	ND	ND	<20.0	<280	128
RPS-S-D2-2/4	<29.0	554	<53.0	<540	<28.0	<940	<20.0	ND	ND	ND	<310	ND
SAP-S-1-0/2	ND	472	<53.0	<550	<32.0	ND	<26.0	ND	ND	<19.0	<300	2310
SAP-S-1-10/14	<33.0	884	<63.0	<610	ND	<1000	ND	ND	ND	ND	<330	134
SAP-S-1-2/6	ND	567	<50.0	<580	<34.0	<1100	ND	ND	ND	ND	<240	<79.0
SAP-S-1-6/10	<36.0	970	<52.0	<580	<35.0	ND	<25.0	ND	ND	ND	<300	<81.0
SAP-S-2-0/2	<32.0	580	<47.0	<520	ND	ND	<24.0	ND	ND	ND	<270	270
SAP-S-2-10/14	ND	1310	<38.0	ND	<34.0	<1000	<24.0	ND	ND	ND	<210	<82.0
SAP-S-2-2/6	<34.0	716	<46.0	<600	ND	ND	ND	ND	ND	ND	<310	<83.0
SAP-S-2-6/10	ND	1120	<40.0	<630	ND	ND	<24.0	ND	ND	ND	<250	101
SAP-S-3-0/2	<30.0	606	<47.0	ND	<31.0	ND	ND	ND	ND	ND	<250	<76.0
SAP-S-3-10/14	ND	1000	<51.0	<630	<33.0	ND	ND	ND	ND	<22.0	<270	<72.0
SAP-S-3-2/6	ND	756	<52.0	<570	<34.0	ND	ND	ND	ND	ND	<330	111
SAP-S-3-6/10	ND	1010	<65.0	ND	<35.0	<1100	<23.0	ND	ND	ND	<310	<75.0
SAP-S-4-0/2	ND	529	<64.0	<640	<36.0	<1100	<28.0	ND	321	ND	<300	2350
SAP-S-4-10/14	<36.0	929	<48.0	<660	<34.0	<1100	ND	ND	ND	ND	<280	<175
SAP-S-4-2/6	ND	592	<46.0	<540	<35.0	ND	<23.0	ND	ND	ND	<270	328
SAP-S-4-6/10	ND	957	<37.0	<520	<28.0	ND	<20.0	ND	ND	ND	<250	107
SA-S-A1-0/2	ND	586	<50.0	ND	<44.0	<1300	<30.0	ND	ND	<27.0	<310	<100
SA-S-A1-2/4	ND	478	<29.0	ND	<34.0	<960	<21.0	ND	ND	ND	<180	<75.0
SA-S-A2-0/2	ND	581	<52.0	<490	<30.0	ND	ND	ND	ND	<18.0	<310	<74.0
SA-S-A2-2/4	<31.0	531	<52.0	<540	<29.0	ND	ND	ND	ND	<20.0	<280	<78.0
SA-S-A3-0/2	<58.0	596	<60.0	ND	<50.0	<1600	ND	ND	ND	<34.0	<310	<120
SA-S-A3-2/4	ND	389	<58.0	<810	<63.0	ND	<39.0	ND	ND	<33.0	<310	<130
SA-S-A4-0/2	ND	536	<55.0	ND	<34.0	<970	ND	ND	ND	<20.0	<310	<74.0
SA-S-A4-2/4	<32.0	452	<51.0	<580	<32.0	<960	ND	ND	ND	ND	<300	<67.0
SA-S-B1-0/2	<32.0	556	<54.0	<490	<31.0	ND	<22.0	ND	ND	ND	<280	<73.0
SA-S-B1-2/4	<33.0	447	<46.0	<510	<30.0	ND	<21.0	ND	ND	ND	<310	<72.0
SA-S-B2-0/2	<32.0	441	<49.0	ND	<31.0	<940	<21.0	ND	ND	ND	<300	<69.0
SA-S-B2-2/4	<35.0	526	<43.0	<550	<35.0	<990	ND	ND	ND	ND	<300	<77.0
SA-S-B3-0/2	<32.0	676	<44.0	ND	<32.0	<930	<23.0	ND	ND	ND	<300	85.3
SA-S-B3-2/4	ND	518	<55.0	<520	36.9	ND	ND	ND	ND	<20.0	<300	<71.0
SA-S-B4-0/2	<32.0	612	<42.0	ND	<31.0	<900	ND	ND	ND	ND	<310	<75.0
SA-S-B4-2/4	<31.0	482	<56.0	<600	<33.0	ND	ND	ND	ND	ND	<300	<71.0
SA-S-C1-0/2	<34.0	415	<57.0	ND	37.5	<900	<21.0	ND	ND	ND	<280	<69.0



TABLE 3 (Continued)

ON-SITE METALS CONCENTRATIONS IN SOIL AND SLUDGE,  
ANALYTICAL RESULTS SUMMARY  
AGROMAC-LOCKWOOD, OPERABLE UNIT 2 – GERING, NEBRASKA  
RESULTS REPORTED IN MILLIGRAMS PER KILOGRAM

Sample Number	Arsenic	Barium	Cadmium	Chromium	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
PRG	440	100000	810	450	750	32000	610	10000	41000	10000	10000	100000
SA-S-C1-2/4	ND	430	<46.0	ND	<33.0	<900	<21.0	ND	ND	ND	<280	<75.0
SA-S-C2-0/2	<32.0	522	<41.0	<460	<30.0	ND	<21.0	ND	ND	<19.0	<300	<72.0
SA-S-C2-2/4	ND	525	<66.0	<520	<31.0	ND	<22.0	ND	ND	ND	<300	<76.0
SA-S-C3-0/2	ND	510	<59.0	<480	<30.0	ND	<22.0	ND	ND	ND	<300	<70.0
SA-S-C3-2/4	ND	616	<40.0	ND	<32.0	<930	ND	ND	ND	<19.0	<300	<73.0
SA-S-C4-0/2	ND	579	<52.0	<520	39.9	<910	ND	ND	ND	ND	<300	<77.0
SA-S-C4-2/4	<32.0	461	<62.0	<510	<30.0	ND	ND	ND	ND	ND	<310	<76.0
SA-S-D1-0/2	ND	628	<54.0	<550	70.1	ND	ND	ND	ND	<20.0	<310	161
SA-S-D1-2/4	ND	449	<67.0	ND	<33.0	<880	<22.0	ND	ND	ND	<300	<79.0
SA-S-D2-0/2	<32.0	650	<63.0	<510	<33.0	<900	ND	ND	ND	ND	<330	<68.0
SA-S-D2-2/4	ND	540	<60.0	<490	<33.0	ND	ND	ND	ND	<19.0	<310	107
SA-S-D3-0/2	<31.0	478	<53.0	<520	ND	ND	<22.0	ND	ND	<19.0	<310	<73.0
SA-S-D3-2/4	<31.0	520	<58.0	<580	<29.0	<990	<22.0	ND	ND	ND	<330	<72.0
SA-S-D4-0/2	<31.0	646	<55.0	ND	<32.0	<910	ND	ND	ND	ND	<310	<74.0
SA-S-D4-2/4	<32.0	582	<52.0	ND	<34.0	ND	<21.0	ND	ND	<19.0	<310	<69.0
SA-S-E1-0/2	<30.0	468	<41.0	<540	ND	<940	<23.0	ND	ND	ND	<280	<73.0
SA-S-E1-2/4	<30.0	527	<49.0	<480	<30.0	ND	ND	ND	ND	ND	<280	73.0
SA-S-E2-0/2	<33.0	444	<64.0	<510	<32.0	ND	ND	ND	ND	ND	<330	<74.0
SA-S-E2-2/4	<33.0	571	<46.0	<540	<32.0	ND	ND	ND	ND	ND	<310	<75.0
SA-S-E3-0/2	<32.0	608	<40.0	<490	37.4	<870	ND	ND	ND	ND	<300	<66.0
SA-S-E3-2/4	ND	466	<48.0	<510	<30.0	<910	ND	ND	ND	ND	<310	<74.0
SA-S-E4-0/2	ND	515	<52.0	ND	<32.0	<930	ND	ND	ND	ND	<310	<76.0
SA-S-E4-2/4	<30.0	413	<49.0	<520	ND	<910	<22.0	ND	ND	ND	<310	<73.0
SI-S-1-0/2	ND	565	<66.0	<520	<35.0	ND	<24.0	ND	ND	ND	<280	149
SI-S-1-10/14	<33.0	769	<49.0	<490	<34.0	ND	ND	ND	ND	ND	<300	111
SI-S-1-2/6	ND	801	<63.0	<640	<36.0	ND	<23.0	ND	ND	ND	<280	<84.0
SI-S-1-6/10	ND	838	<54.0	<600	<36.0	ND	<25.0	ND	ND	<21.0	<280	113
SI-S-2-0/2	<34.0	568	<59.0	<570	39.0	ND	ND	ND	ND	ND	<330	727
SI-S-2-10/14	ND	634	<50.0	<580	<34.0	ND	<23.0	ND	ND	ND	<280	163
SI-S-2-2/6	ND	478	<47.0	508	26.9	<760	ND	15.1	ND	ND	<300	<67.8
SI-S-2-6/10	<38.0	1010	<61.0	ND	<37.0	ND	ND	ND	ND	ND	<310	206
SI-S-3-0/2	<39.0	569	<52.0	<580	60.1	ND	ND	ND	ND	<21.0	<270	454
SI-S-3-10/14	ND	752	<54.0	<570	<34.0	<990	ND	ND	ND	ND	<280	192
SI-S-3-2/6	<36.0	929	<50.0	<610	<36.0	ND	ND	ND	ND	ND	<280	<87.0
SI-S-3-6/10	ND	866	<49.0	ND	<34.0	<1000	ND	ND	ND	ND	<310	128
SI-S-4-0/2	ND	603	<49.0	<580	<32.0	<1000	ND	ND	ND	ND	<300	209
SI-S-4-10/14	ND	1040	<47.0	<630	<37.0	<1100	ND	16.9	ND	ND	<310	<87.0
SI-S-4-2/6	ND	655	<67.0	<600	<34.0	<1000	<26.0	ND	ND	ND	<390	<82.0
SI-S-4-6/10	ND	663	<31.0	<630	47.6	ND	ND	ND	ND	ND	<180	<82.0
SI-S-5-0/2	<45.0	518	<56.0	<610	109	<1100	ND	ND	ND	ND	<280	317
SI-S-5-10/14	ND	1160	<45.0	<570	<35.0	<970	<24.0	ND	ND	<21.0	<310	119
SI-S-5-2/6	<33.0	666	<47.0	ND	<33.0	<1100	ND	ND	ND	ND	<300	<75.0

TABLE 3 (Continued)

ON-SITE METALS CONCENTRATIONS IN SOIL AND SLUDGE,  
ANALYTICAL RESULTS SUMMARY  
AGROMAC-LOCKWOOD, OPERABLE UNIT 2 – GERING, NEBRASKA  
RESULTS REPORTED IN MILLIGRAMS PER KILOGRAM

Sample Number	Arsenic	Barium	Cadmium	Chromium	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
PRG	440	100000	810	450	750	32000	610	10000	41000	10000	10000	100000
SI-S-5-6/10	ND	673	<41.0	<510	<27.0	<870	<20.0	ND	ND	ND	<280	<66.0
SI-S-6-0/2	ND	608	<29.0	<570	<35.0	ND	<21.0	ND	ND	<20.0	<210	117
SI-S-6-10/14	ND	774	<51.0	<540	<33.0	<900	ND	ND	ND	ND	<310	<86.0
SI-S-6-2/6	ND	848	<58.0	<540	<34.0	ND	<23.0	ND	ND	ND	<310	<78.0
SI-S-6-6/10	<34.0	741	<50.0	<600	<33.0	ND	<24.0	ND	ND	ND	<300	<80.0
SMP-S-1-0/2	ND	468	<68.0	<610	106	ND	<23.0	ND	ND	ND	<300	365
SMP-S-1-2/6	<31.0	562	<51.0	<480	<30.0	ND	<21.0	ND	ND	ND	<300	<66.0
SMP-S-1-6/10	<33.0	541	<47.0	ND	33.5	<940	ND	ND	ND	ND	<250	<73.0
SMP-S-2-0/2	ND	521	<41.0	<490	<31.0	<840	<19.0	ND	ND	ND	<300	<73.0
SMP-S-2-2/6	ND	398	<51.0	<550	<33.0	<940	<21.0	ND	ND	ND	<300	<75.0
SMP-S-2-6/10	ND	496	<58.0	<520	34.1	ND	<21.0	ND	ND	ND	<280	82.9
SMP-S-3-0/2	<32.0	470	<51.0	ND	34.9	<900	ND	ND	ND	ND	<300	86.7
SMP-S-3-2/6	<31.0	786	<55.0	<540	<31.0	ND	<22.0	ND	ND	ND	<310	<75.0
SMP-S-3-6/10	<32.0	551	<42.0	ND	<31.0	<910	<23.0	ND	ND	ND	<250	<70.0
SMP-S-4-0/2	ND	490	<55.0	<510	<34.0	<900	ND	ND	ND	ND	<300	<78.0
SMP-S-4-2/6	<31.0	625	<41.0	<510	<30.0	ND	ND	ND	ND	<18.0	<300	<77.0
SMP-S-4-6/10	ND	488	<43.0	<550	<32.0	<960	ND	ND	ND	ND	<270	<73.0
SMP-S-5-0/2	<32.0	536	<53.0	<520	ND	ND	<22.0	ND	ND	ND	<270	<73.0
SMP-S-5-2/6	<32.0	586	<51.0	<540	<33.0	ND	ND	ND	ND	ND	<300	<72.0
SMP-S-5-6/10	ND	522	<54.0	<510	<32.0	ND	<21.0	ND	ND	<18.0	<280	<76.0
SMP-S-6-0/2	ND	640	<39.0	ND	60.9	<990	ND	ND	ND	ND	<300	86.2
SMP-S-6-2/6	ND	552	<48.0	<570	<32.0	ND	<24.0	ND	ND	<21.0	<300	<75.0
SMP-S-6-6/10	ND	523	<53.0	<570	<32.0	ND	ND	ND	ND	<21.0	<300	<76.0
SMP-S-7-0/2	ND	508	<60.0	<540	<33.0	ND	<23.0	ND	ND	ND	<300	<75.0
SMP-S-7-2/6	<31.0	468	<49.0	ND	<32.0	<1000	<22.0	ND	ND	ND	<280	<71.0
SMP-S-7-6/10	ND	460	<41.0	ND	<32.0	<940	ND	ND	ND	ND	<270	<67.0
SMP-S-8-0/2	<34.0	483	<46.0	ND	36.6	<880	ND	ND	ND	ND	<300	<77.0
SMP-S-8-2/6	<30.0	698	<54.0	<510	ND	ND	ND	ND	ND	<20.0	<300	<73.0
SMP-S-8-6/10	<32.0	403	<54.0	<520	<32.0	ND	<21.0	ND	ND	ND	<280	<24.0
SMWB-SLU	ND	258	<47.0	ND	255	ND	ND	ND	ND	<15.0	<270	832
SR-S-1-0/2	<32.0	510	<32.0	<550	<32.0	<940	ND	ND	ND	ND	<250	<78.0
SR-S-1-10/14	<35.0	602	<64.0	<600	<35.0	ND	ND	ND	ND	ND	<330	<81.0
SR-S-1-2/6	<31.0	532	<57.0	<480	<29.0	ND	<21.0	ND	ND	ND	<310	<67.0
SR-S-1-6/10	ND	536	<53.0	<570	<33.0	ND	<21.0	ND	ND	ND	<340	<80.0
SR-S-2-0/2	<36.0	641	<33.0	<580	61.2	<1000	ND	ND	ND	ND	<190	88.5
SR-S-2-10/14	ND	693	<65.0	<520	<33.0	ND	ND	ND	ND	<20.0	<300	181
SR-S-2-2/6	ND	549	<47.0	<540	36.9	ND	ND	ND	ND	<20.0	<270	89.1
SR-S-2-6/10	<33.0	576	<53.0	<610	<31.0	ND	ND	ND	ND	ND	<250	<85.0
SR-S-3-0/2	<37.0	544	<33.0	<540	47.6	ND	<24.0	ND	ND	ND	<180	99.6
SR-S-3-10/14	ND	733	<42.0	<540	<36.0	ND	<24.0	ND	ND	<22.0	<270	97.3
SR-S-3-2/6	ND	472	<55.0	886	<32.0	<1100	ND	ND	ND	ND	<300	<76.0
SR-S-3-6/10	<33.0	492	<50.0	<520	<34.0	ND	<25.0	ND	ND	ND	<300	<80.0



TABLE 3 (Continued)

**ON-SITE METALS CONCENTRATIONS IN SOIL AND SLUDGE,  
ANALYTICAL RESULTS SUMMARY  
AGROMAC-LOCKWOOD, OPERABLE UNIT 2 – GERING, NEBRASKA  
RESULTS REPORTED IN MILLIGRAMS PER KILOGRAM**

Sample Number	PRG	Arsenic	Barium	Cadmium	Chromium	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Silver	Zinc
		440	100000	810	450	750	32000	610	10000	41000	10000	10000	100000
SR-S-4-0/2		<34.0	564	<48.0	<520	<33.0	ND	ND	ND	ND	<21.0	<280	132
SR-S-4-10/14		<34.0	654	<47.0	<570	<32.0	<1000	ND	ND	ND	ND	<280	<74.0
SR-S-4-2/6		ND	597	<57.0	<580	<32.0	<1000	<22.0	ND	ND	ND	<310	107
SR-S-4-6/10		ND	531	<55.0	<520	<36.0	ND	<21.0	ND	ND	ND	<280	<82.0
ST-SLU		183	350	<55.0	<970	221	ND	ND	ND	ND	79.7	<310	5300
SWD-S-1-0/2		ND	471	<43.0	ND	232	<1000	ND	ND	ND	<18.0	<280	1430
SWD-S-1-2/4		ND	708	<52.0	<580	<31.0	<1000	ND	ND	ND	ND	<310	<72.0
SWD-S-2-0/2		<37.0	658	<46.0	<520	46.3	ND	ND	ND	ND	<20.0	<300	645
SWD-S-2-2/4		ND	772	<48.0	<570	<36.0	<1000	<24.0	ND	ND	ND	<270	ND
SWD-S-3-0/2		<37.0	453	<49.0	<570	37.1	ND	ND	ND	ND	<21.0	<300	130
SWD-S-3-2/4		<33.0	974	<51.0	<510	<31.0	ND	ND	ND	ND	ND	<310	81.7
SWD-S-4-0/2		ND	473	<51.0	<490	64.8	ND	<23.0	ND	ND	ND	<300	123
SWD-S-4-2/4		ND	596	<48.0	<510	47.8	ND	<22.0	ND	ND	<19.0	<300	<75.0
SWD-S-5-0/2		ND	509	<69.0	<540	<32.0	<960	ND	ND	ND	ND	<310	88.0
SWD-S-5-2/4		<30.0	474	<37.0	ND	<30.0	<960	ND	ND	ND	<20.0	<270	79.1
SWD-S-6-0/2		<33.0	657	<56.0	<570	<31.0	ND	<21.0	ND	ND	ND	<300	<77.0
SWD-S-6-2/4		<32.0	541	<41.0	<520	<32.0	ND	<22.0	ND	ND	ND	<300	<74.0
SWD-S-7-0/2		<35.0	470	<51.0	<510	53.4	ND	<22.0	ND	ND	ND	<300	1130
SWD-S-7-2/4		ND	497	<54.0	ND	<34.0	<1100	<21.0	ND	ND	ND	<280	85.2
SWD-S-8-0/2		<35.0	562	<47.0	ND	36.5	<990	<25.0	ND	ND	ND	<270	225
SWD-S-8-2/4		ND	1330	<54.0	<610	45.3	ND	<23.0	ND	ND	<21.0	<300	<76.0

## Notes:

Data field highlighted with gray indicates the result exceeds the PRG.

Results with less than symbols were not highlighted with gray if they exceeded the PRG due to their undefined status.

PRG numbers are based on industrial soil guidelines.

Health- based standards and results are reported in milligrams per Kilogram.

Arsenic PRG value is based on a noncancer endpoint.

The nickel PRG is based on its soluble salt form.

Appendix E provides a sample nomenclature description.

ND Not detected

PRG Preliminary remediation goal

< Less than

TABLE 4

**OFF-SITE METALS CONCENTRATIONS IN SOIL AND SLUDGE,  
ANALYTICAL RESULTS SUMMARY  
AGROMAC-LOCKWOOD, OPERABLE UNIT 2 – GERING, NEBRASKA  
RESULTS REPORTED IN MILLIGRAMS PER KILOGRAM**

Sample Number	Arsenic	Barium	Cadmium	Chromium	Lead	Manganese	Mercury	Selenium	Silver	Zinc
PRG	440	100000	810	450	750	32000	610	10000	10000	10000
BA-S-4-0/2	4.60N	180	1.30	.221	27.8	621	0.0300B	1.10	ND	401
BAC-SLU	ND	ND	49.3	.650	10.2	2210	ND	ND	ND	147000
BA-S-2-2/6	ND	257	1.00B	7.80	7.10	251	0.0100B	ND	ND	35.1
GBS-METALLIC	13.6N	ND	79.5	1.40B	12700	36.0	0.0300	ND	1.10B	743000
GBS-S-4-2/6	ND	59.6	0.600B	4.30	19.2	80.8	ND	ND	ND	1490
HWSA-S-2-2/4	ND	185	1.20B	9.50	8.10	287	0.0100B	ND	ND	41.9
HWSB-S-2-0/2	4.00N	157	2.70	73.8	541	463	0.0300B	ND	ND	1540
HWSC-S-1-2/4	ND	254	2.90B	6.80B	24.7	451	0.0100B	ND	ND	6470
HWSC-S-4-2/4	0.960BN	257	0.910B	7.50	14.4	472	0.0100B	ND	ND	3670
HWSC-S-6-0/2	ND	274	47.5	10.8B	1390	228	0.0200B	ND	ND	149000
HWSC-S-7-2/4	ND	251	1.00B	7.20	8.90	299	0.0100B	ND	ND	908
HWSC-SLU	4.60BN	454*	9.40	47.9	423	204	0.0200B	ND	ND	13700
HWSD-S-B4-0/2	1.40BN	267	1.00B	7.40	10.3	370	0.0100B	0.840B	ND	111
MTS-GB-SLU-1	8.60BN	34.8*	18.4	.95	797	679	0.0200B	ND	ND	78900
MTS-GB-SLU-2	5.90BN	96.8*	15.7	432	201	916	0.0200B	ND	ND	88300
MTS-GB-SLU-3	ND	37.9*	5.40B	184	234	669	0.0200B	ND	1.10UN	75300
MTS-GB-SLU-3	ND	69.7	6.02	219	281	729	0.0210B	ND	ND	80500
MTS-GB-SLU-4	ND	126*	0.670B	8.70	18.0	165	0.0100B	ND	ND	508
SEDS-S-A14-0/2	3.00N	224	3.30	10.5	144	332	0.0100B	ND	ND	6040
SEDS-S-A2-0/2	3.20BN	289	1.90B	14.3	107	388	0.0100B	ND	ND	1380
SEDS-S-B4-0/2	ND	208	1.70B	7.90B	1030	288	0.190	ND	ND	1950
SEDS-S-B4-2/4	2.90N	247	1.50	9.30	1260	356	0.0900	ND	ND	358
SEDS-S-C1-0/2	ND	217	1.40B	8.90	49.2	279	0.0100B	ND	ND	1210
SEDS-S-C2-0/2	ND	326	1.30B	10.3	62.2	287	0.0200B	ND	ND	2090
SEDS-S-C3-2/4	ND	200	1.20B	8.10	27.6	359	0.0300B	ND	ND	1440
OS-S-01-0/2	2.30N	246	1.20	9.20*	10.0	346	0.010B	ND	ND	55.4
OS-S-1-10/14	1.40BN	182	0.620B	4.50*	5.50	372	ND	ND	ND	16.1
OS-S-1-2/6	3.80N	278	0.930B	7.60*	8.10	345	0.00B	ND	ND	28.1
OS-S-1-6/10	2.40N	329	0.820B	6.40*	7.20	399	0.0100B	ND	ND	22.8
OS-S-4-0/2	3.00N	223	1.20	10.1*	10.6	354	0.0100B	0.890B	ND	51.2
OS-S-4-10/14	1.89B	175	0.641B	4.35	7.46	321	0.00440B	ND	ND	16.8
OS-S-4-10/14	3.10N	173	0.630B	4.70	6.50	324	0.00B	ND	ND	17.0
OS-S-4-2/6	0.900BN	302	1.00B	8.40*	7.80	359	0.0100B	1.00B	ND	34.3
OS-S-4-6/10	3.30N	395	0.980B	8.20*	7.50	347	0.0100B	ND	ND	29.1
RPS-S-A2-0/2	0.950BN	167	0.750B	28.1*	103	280	0.0100B	ND	ND	339
RPS-S-C2-0/2	ND	300	0.970B	350*	3470	302	0.0100B	ND	ND	103
RPS-S-C2-0/2	ND	300	0.970B	350*	3470	302	0.0100B	ND	ND	103
SAP-S-1-0/2	ND	201	1.50	16.6*	9.30	269	0.0100B	ND	ND	3790
SAP-S-4-0/2	ND	246	0.970B	11.0*	11.9	310	0.0100B	ND	ND	2590

TABLE 4 (Continued)

**OFF-SITE METALS CONCENTRATIONS IN SOIL AND SLUDGE,  
ANALYTICAL RESULTS SUMMARY  
AGROMAC-LOCKWOOD, OPERABLE UNIT 2 – GERING, NEBRASKA  
RESULTS REPORTED IN MILLIGRAMS PER KILOGRAM**

Sample Number	Arsenic	Barium	Cadmium	Chromium	Lead	Manganese	Mercury	Selenium	Silver	Zinc
PRG	440	100000	810	450	750	32000	610	10000	10000	10000
SA-S-B3-2/4	2.90N	328	1.20B	9.80*	7.90	298	0.0100B	ND	ND	41.2
SA-S-D1-0/2	2.00BN	315	1.40	15.9*	76.9	284	0.0100B	ND	ND	206
SI-S-2-0/2	ND	300	1.20	12.0*	30.2	435	0.0100B	1.20	ND	643
SI-S-2-2/6	ND	255	0.940B	10.5*	10.1	349	0.0100B	ND	ND	70.4
SI-S-5-0/2	ND	253	1.10B	32.2*	106	314	0.0100B	1.40	ND	349
SMP-S-1-0/2	3.60	161	0.860	37.8	98.1	347	0.0200B	ND	0.340B	494
SMP-S-3-0/2	ND	191	0.910B	8.00*	12.9	229	0.0100B	ND	ND	55.1
SMP-S-3-0/2	ND	195	0.957B	10.6	12.6	248	0.00490B	ND	ND	55.7
SMP-S-6-0/2	2.70	188	0.500B	11.9	35.2	235	0.0100B	ND	ND	92.2
SMWB-SLU	3.30BN	354*	7.70	59.7	409	481	0.0500B	ND	ND	1060
SR-S-2-0/2	3.00	348	0.460B	25.4	64.0	280	0.0100B	ND	0.400B	42.0
SR-S-3-2/6	2.90	232	0.380B	8.80	9.50	258	0.0100B	ND	0.290B	35.1
ST-SLU	44.1N	238*	6.70B	13.5B	50.1	105	0.480	15.7	1.80BN	2120
SWD-S-1-0/2	2.70	261	0.850	11.8	207	317	0.120	ND	0.230B	1550
SWD-S-7-0/2	3.20	185	1.50	13.2	58.3	251	0.0100B	ND	ND	1520

## Notes:

Data field highlighted with gray indicates the result exceeds the PRG.

PRG numbers are based on industrial soil guidelines.

Sample results listed twice are not field duplicates. The laboratory simply ran the sample twice, and both results are reported.

Health-based standards and results are reported in milligrams per kilogram

Arsenic PRG value is based on a noncancer endpoint.

See Appendix E for sample nomenclature description.

B Reported value was less than the contract required detection limits, but greater than or equal to the instrument detection limit.

N Spiked sample recovery was not within control limits.

ND Not detected

PRG Preliminary remediation goal

\* Duplicate sample results were not within control limits.

## 4.2 TOTAL METALS IN GROUNDWATER AND WASTEWATER

Fifty-eight samples were submitted to the Columbia Analytical Services laboratory in Rochester, New York for totals metals analysis. The samples were analyzed for the RCRA metals plus manganese and zinc by EPA SW-846 Methods 6010B and 7470A. Analytical data packages for the Columbia Analytical Services laboratory results are provided in Attachment 8. A summary of the results for total metals in groundwater and wastewater is included as Table 5. The results in the summary table that exceeded the MCL or PRG are highlighted with gray. PRGs and MCLs were used for comparison purposes because the state of Nebraska has no established cleanup guidelines. All metals, with the exception of mercury and silver, were reported above their respective MCLs or PRGs. Most of these detections were in Geoprobe™ temporary well samples. The Geoprobe™ temporary well samples contained a significant amount of silt, which is thought to have led to the high sample concentrations. These detections, however, are considered to be insignificant because their concentrations are very similar to background concentrations detected in Geoprobe™ temporary well samples. The total metals results for the off-site private wells and on-site monitoring wells are considered useable for removal decisions because a low silt content was observed. OS-PW-09 was a performance evaluation sample submitted to the laboratory as a blind to further validate the integrity of the data. The PE sample results and acceptable result ranges are listed in Tables 1 and 2. Figures 9 and 10 display on-site and off-site groundwater sample collection points, respectively. These figures also display sample results for total metals that exceed their associated MCLs or PRGs.

TABLE 5

**OFF-SITE TOTALS METALS CONCENTRATIONS IN  
GROUNDWATER AND WASTEWATER, ANALYTICAL RESULTS SUMMARY  
AGROMAC-LOCKWOOD, OPERABLE UNIT 2 – GERING, NEBRASKA  
(RESULTS REPORTED IN MICROGRAMS PER LITER)**

Sample Number	Arsenic	Barium	Cadmium	Chromium	Lead	Manganese	Mercury	Selenium	Silver	Zinc
MCL	50.0	2000	5.00	100	15.0	NA	11.0	50.0	NA	NA
PRC	NA	2600	NA	NA	NA	880	2.00	180	180	11000
GB-GGW-1	73.4	13100	13.9B	335NE	178	10300	0.0600B	ND	ND	1130NE
GB-GGW-2	35.4	4940	16.1	279NE	92.6	8910	0.0600B	ND	ND	21300NE
GB-GGW-3	50.2	2560	5.10	142	82.9E	5240	0.0600B	7.60	ND	445
GB-GGW-4	87.8	6650	15.7	425NE	220	9220	0.0400B	9.90B	ND	3470NE
GB-GGW-5	13.6	515	2.30B	27.1	23.3E	1340	ND	8.20	ND	82.6
HWSC-WW	ND	148	ND	ND	3.60B	146	ND	ND	ND	343
HWSC-WWD	ND	150	ND	ND	3.51B	147.4	ND	ND	ND	348
HWSC-WW-FD	ND	150	ND	ND	2.30B	136	ND	ND	1.10B	231
MW LW-01	19.0	87.6	ND	3.40B	4.80B	64.9	ND	4.90B	ND	9.70B
MW LW-03	4.80B	57.6	ND	1.60B	2.10B	1300	ND	ND	ND	241
MW LW-04	14.5	73.5	ND	2.30B	1.30B	3450	ND	ND	ND	4.50B
MW LW-06	25.0	59.7	ND	4.90B	ND	11.1	ND	4.00B	ND	4.80B
MW LW-07	13.8	900	4.30B	60.5	33.3	1980	ND	8.10	ND	150
MW LW-07-FD	24.1	997	4.80B	66.2	36.2	2230	ND	10.5	ND	165
MW LW-08	51.3	354	1.60B	22.2	8.60	554	ND	7.50	ND	52.8
MW LW-08D	50.7	361	1.56B	22.4	8.91	569	ND	8.13	ND	54.0
MW M-01	ND	30.0	ND	1.30B	0.920B	339	ND	6.30	ND	134
MW M-02	15.7	46.8	ND	2.00B	ND	257	ND	ND	ND	ND
MW M-03	19.1	68.5	ND	1.70B	ND	ND	ND	4.10B	ND	ND
MW M-04	ND	17.7B	ND	2.30B	2.60B	2590	ND	ND	ND	186
MW M-05	15.6	63.7	0.750B	2.20B	ND	293	0.700	4.80B	ND	ND
MW M-06	ND	60.3	ND	1.30B	ND	926	ND	ND	ND	199
MW M-07	14.4	93.1	ND	2.00B	ND	73.6	ND	4.50B	ND	4.90B
MW M-08	15.3	69.3	0.930B	2.40B	ND	12.9	ND	ND	ND	ND
MW MI-01	5.30B	10.7B	ND	1.80B	2.80B	445	ND	6.00	ND	390
MW MI-02	5.60B	200	2.80B	ND	2.40B	494	ND	ND	ND	1040
MW RF-05-FD	22.9	153	0.690B	12.4	4.80B	195	ND	7.20	ND	24.0B
MWLW-02	29.1	115	ND	10.1	2.30B	66.1	ND	8.10	ND	12.0B
MWLW-05	24.2	77.8	ND	2.50B	3.30B	1510	ND	8.80	ND	20.2B
OS-EDS-GGW-1	8.40B	464	2.10B	18.4	9.30E	1570	ND	ND	ND	71.4
OS-GGW-1	23.5	1050	2.40B	24.8NE	12.9	822	0.0200B	13.8	ND	67.6NE
OS-GGW-2	65.0	11300	15.0B	845NE	222	10900	0.160B	13.1B	ND	1470NE
OS-GGW-3	39.7	7350	15.8	135NE	85.0	6120	0.0500B	ND	ND	411NE
OS-GGW-4	69.6	13300	13.2B	339NE	272	13800	0.0300B	ND	ND	1100NE
OS-MUW-01	7.00B	243	ND	ND	9.40	509	ND	4.10B	ND	142
OS-PW-01	16.0	32.5	ND	ND	6.50	ND	ND	5.80	ND	111
OS-PW-01-FD	15.5	34.0	ND	ND	3.60B	ND	ND	6.30	0.810B	259
OS-PW-02	8.80B	30.9	ND	ND	ND	2.80B	ND	7.70	ND	10.6B
OS-PW-02D	8.65B	29.8	ND	ND	ND	ND	ND	8.90	ND	9.87B
OS-PW-03	19.8	61.6	ND	ND	ND	126	ND	10.2	ND	16.1B
OS-PW-04	13.9	45.4	ND	ND	ND	57.3	ND	ND	ND	29.4B



TABLE 5 (Continued)

**OFF-SITE TOTALS METALS CONCENTRATIONS IN  
GROUNDWATER AND WASTEWATER, ANALYTICAL RESULTS SUMMARY  
AGROMAC-LOCKWOOD, OPERABLE UNIT 2 - GERING, NEBRASKA  
(RESULTS REPORTED IN MICROGRAMS PER LITER)**

Sample Number	Arsenic	Barium	Cadmium	Chromium	Lead	Manganese	Mercury	Selenium	Silver	Zinc
MCL	50.0	2000	5.00	100	15.0	NA	11.0	50.0	NA	NA
PRG	NA	2600	NA	NA	NA	880	2.00	180	180	11000
OS-PW-04-FD	13.7	52.2	ND	ND	ND	619	ND	ND	ND	68.7
OS-PW-05	28.0	46.6	ND	ND	ND	ND	ND	6.30	ND	35.5B
OS-PW-06	22.6	40.8	ND	ND	ND	ND	ND	8.30	ND	13.4B
OS-PW-07	38.1	52.7	ND	ND	ND	13.4	ND	ND	ND	6.30B
OS-PW-08	14.0	63.0	ND	ND	ND	ND	ND	10.8	ND	102
OS-PW-09	112	1040	17.9	81.3	14.2	75.2	6.00	37.7	184	573
OS-PW-10	22.1	42.1	ND	ND	ND	ND	ND	ND	ND	19.9BNE
OS-PW-11	27.2	44.3	ND	ND	28.6	2.90B	ND	ND	ND	126NE
OS-PW-12	28.6	43.2	ND	ND	12.6	ND	ND	ND	ND	121NE
OS-PW-13	26.9	37.3B	ND	ND	ND	ND	ND	ND	ND	26.4BNE
OS-PW-14	27.2	39.4B	ND	ND	2.80B	ND	ND	ND	ND	42.0NE
RF-01	16.8	68.6	ND	4.00B	2.00B	323	ND	13.7	ND	12.6B
RF-02	10.2	291	1.10B	13.9	7.00	469	ND	14.2	ND	38.9B
RF-03	14.8	29.4	ND	2.40B	1.50B	38.7	ND	8.20	ND	13.4B
RF-04	21.4	82.0	ND	3.60B	1.30B	22.2	ND	11.4	ND	6.60B
RF-05	23.2	128	0.570B	10.8	4.00B	157	ND	7.60	ND	18.8B
RF1-FD	16.5	65.3	ND	4.80B	1.90B	333	ND	11.7	ND	11.8B
RINSATE-S1	ND	ND	ND	ND	ND	ND	ND	ND	0.950B	4.50B
RINSATE-S2	ND	ND	ND	ND	ND	ND	ND	ND	0.940B	7.50B
RINSATE-S3	ND	ND	ND	ND	ND	ND	ND	ND	1.00B	27.8B
RINSATE-S4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
RINSATE-S5	ND	ND	ND	ND	ND	ND	ND	ND	0.900B	ND
RINSATE-S7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
RINSATE-S8	ND	ND	ND	ND	0.820BE	ND	ND	ND	0.970B	11.3B
SA GGW-01	81.3	9890	9.40	237	200	16100	0.0300B	8.10	ND	960
SA GGW-01 D	83.8	10800	10.5	203	196	14400	0.210	15.0	ND	1000
SI-GGW-1	34.4	6030	19.2	164NE	113	7340	0.0500B	ND	ND	483NE
SI-GGW-2	85.0	17300	14.6B	262NE	183	17200	0.130B	ND	ND	821NE
SI-GGW-2D	98.2	18200	15.2	266	190	18000	0.128B	ND	ND	846
SI-GGW-2S	119	17300	167.0	388N	378	16300	1.19	31	16.8BN	1110N
SI-GGW-3	8.30B	2210	8.80B	81.8NE	50.1	6170	0.0400B	ND	ND	228NE
SI-GGW-3-FD	134	12600	24.8B	449NE	292	22900	0.0400B	ND	ND	1300NE
SI-GGW-4	81.9	10500	17.7	461NE	213	10800	0.0600B	13.9	ND	1080NE
SMWB-WW	11.0B	115	ND	79.4NE	18.6	416	0.04B	ND	ND	235NE

TABLE 5 (Continued)

**OFF-SITE TOTALS METALS CONCENTRATIONS IN  
GROUNDWATER AND WASTEWATER, ANALYTICAL RESULTS SUMMARY  
AGROMAC-LOCKWOOD, OPERABLE UNIT 2 – GERING, NEBRASKA  
(RESULTS REPORTED IN MICROGRAMS PER LITER)**

Sample Number	Arsenic	Barium	Cadmium	Chromium	Lead	Manganese	Mercury	Selenium	Silver	Zinc
MCL	50.0	2000	5.00	100	15.0	NA	11.0	50.0	NA	NA
PRG	NA	2600	NA	NA	NA	880	2.00	180	180	11000
SW BLANK	ND	ND	ND	ND	ND	ND	ND	ND	0.840B	4.40B
SWD-GGW-1	31.6	3840	6.40	60.1	59.4E	5070	0.0400B	5.40	ND	221

## Notes:

Data field highlighted with gray indicates the result exceeds one or both of the health-based standards.

PRG numbers are based on tap water.

Health-based standards and results are reported in micrograms per Liter.

Appendix E provides a sample nomenclature description.

B Reported value was less than the contract-required detection limits, but greater than or equal to the instrument detection limit.

E The reported value was estimated because of interference.

N Spiked sample recovery was not within control limits

MCL Maximum contaminant level

NA Not applicable

ND Not detected

PRG Preliminary remediation goal

### 4.3 DISSOLVED METALS IN GROUNDWATER AND WASTEWATER

Seventy samples were submitted to the Columbia Analytical Services laboratory in Rochester, New York, for analysis for dissolved metals. The samples were analyzed for the RCRA metals plus manganese and zinc by EPA SW-846 Methods 6020 and 7470A. Analytical data packages for the Columbia Analytical Services laboratory results are provided in Attachment 8. A summary of the dissolved metals in groundwater and wastewater results is included as Table 6. The results in the data summary table that exceeded the MCL or PRG are highlighted with gray. PRGs and MCLs were used for comparison purposes because the state of Nebraska has no established cleanup guidelines. Manganese and zinc were reported above their respective PRGs. Chromium was reported above its MCL in a single sample. Figures 11 and 12 display on-site and off-site groundwater sample collection points, respectively. These figures also display sample results for dissolved metals that exceeded their associated MCLs or PRGs.

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TABLE 6

**OFF-SITE DISSOLVED METALS CONCENTRATIONS IN  
GROUNDWATER AND WASTEWATER, ANALYTICAL RESULTS SUMMARY  
AGROMAC-LOCKWOOD, OPERABLE UNIT 2 – GERING, NEBRASKA  
(RESULTS REPORTED IN MICROGRAMS PER LITER)**

Sample Number	Arsenic	Barium	Cadmium	Chromium	Lead	Manganese	Mercury	Selenium	Silver	Zinc
MCL	50.0	2000	5.00	100	15.0	NA	11.0	50.0	NA	NA
PRC	NA	2600	NA	NA	NA	880	2.00	180	180	11000
SWD-GGW-01	8.00	205	0.160	0.590	0.260	1920	ND	ND	0.0800	12.2
GB-GGW-01	4.00	49.2	0.220	1.08	0.300	561	ND	ND	ND	41.5
GB-GGW-02	1.50	50.8	0.360	1.27	0.280	3840	ND	ND	ND	15400
GB-GGW-03	6.50	49.9	0.190	0.700	0.330	242	ND	ND	0.11	7.70
GB-GGW-04	7.20	157	0.460	7.20	6.56	361	ND	ND	0.0500	133
GB-GGW-05	9.10	45.7	0.170	0.550	0.290	143	ND	ND	0.0900	7.10
HWSC-WW	0.620	122	0.0220	1.31	0.125	131	ND	ND	0.0140B	73.6
HWSC-WW-FD	0.620	125	0.0220	1.23	0.145	134	ND	ND	0.0110B	75.4
MW LW-1	14.1	49.5E	ND	ND	0.406B	0.207B	ND	6.26	ND	7.70B
MW LW-2	23.5	69.0E	ND	4.48	ND	0.302B	ND	7.58	ND	6.60B
MW LW-2	23.5	69.0E	ND	4.48	ND	0.302B	ND	7.58	ND	6.60B
MW LW-5	211	18.8E	ND	ND	ND	0.420B	ND	7.26	ND	5.47B
MW LW-6	17.8	53.0E	ND	ND	ND	4.31	ND	4.16	ND	4.60B
MW LW-7	17.7	28.5E	ND	2.98B	0.200B	ND	ND	7.09	ND	7.34B
MW LW-7-FD	16.6	28.0E	ND	3.82B	ND	ND	ND	5.14	ND	4.54B
MW LW-8	43.7	24.1E	ND	2.18B	ND	ND	ND	5.30	3.69N	5.21B
MW M1	ND	26.2	0.0910B	ND	ND	925	ND	4.42	ND	110E
MW M1-1	2.12	9.04	ND	ND	ND	485	ND	5.29	ND	332E
MW M1-2	4.36	38.4E	ND	ND	ND	0.280B	ND	1.18B	ND	31.9B
MW M-2	12.0	39.0	ND	ND	ND	42.2	ND	ND	ND	0.417BE
MW M-3	1.63	52.5E	0.0620B	ND	ND	1160	ND	ND	0.616BN	180
MW M-4	1.03	15.8	ND	ND	0.187B	2720	ND	2.78B	0.202B	151E
MW M-5	10.2	56.0	ND	ND	ND	2.93	ND	3.45B	ND	5.56BE
MW M-6	0.815B	52.7E	ND	ND	ND	821	ND	ND	ND	177
MW M-7	11.2	89.0	ND	ND	ND	27.2	ND	5.66	2.79	3.11BE
MW M-8	11.7	67.2E	ND	ND	ND	4.63	ND	1.82B	ND	5.03B
MW-LW-3	18.1	52.8E	ND	ND	0.187B	0.909B	ND	3.52B	2.95N	9.28B
MW-LW-4	11.7	36.0E	ND	ND	ND	90.9	ND	ND	ND	7.98B
OSEOS-GGW-01	3.70	67.3	0.340	0.550	0.550	1680	ND	ND	0.0900	13.0
OS-GGW-01	17.9	32.3	0.200	1.09	0.200	6.23	ND	ND	ND	4.30
OS-GGW-02	4.80	46.6	ND	1.43	0.370	146	ND	ND	ND	8.70
OS-GGW-03	9.80	47.5	0.110	0.600	0.160	915	ND	ND	ND	5.70
OS-GGW-04	11.6	31.5	0.110	0.700	0.290	22.5	ND	ND	ND	5.60
OS-MUW-01	9.37	136	0.029B	1.04	0.175	9.38	ND	ND	0.00800B	11.6

TABLE 6 (Continued)

**OFF-SITE DISSOLVED METALS CONCENTRATIONS IN  
GROUNDWATER AND WASTEWATER, ANALYTICAL RESULTS SUMMARY  
AGROMAC-LOCKWOOD, OPERABLE UNIT 2 – GERING, NEBRASKA  
(RESULTS REPORTED IN MICROGRAMS PER LITER)**

Sample Number	Arsenic	Barium	Cadmium	Chromium	Lead	Manganese	Mercury	Selenium	Silver	Zinc
MCL	50.0	2000	5.00	100	15.0	NA	11.0	50.0	NA	NA
PRG	NA	2600	NA	NA	NA	880	2.00	180	180	11000
OS-PW-01	19.0	29.7	0.183	0.720	1.00	0.150	ND	ND	0.0260B	79.0
OS-PW-01-FD	18.8	29.2	0.202	1.00	1.12	0.480	ND	ND	0.0120B	277
OS-PW-02	9.51	27.5	0.0140B	1.33	0.191	0.340	ND	ND	ND	7.32
OS-PW-03	20.5	54.0	0.0740	1.03	0.164	74.4	ND	ND	0.00800B	13.5
OS-PW-04	15.6	41.7	0.0440	0.780	0.134	34.1	ND	ND	0.00600B	24.2
OS-PW-04-FD	15.2	40.2	0.0450	0.650	0.188	35.9	ND	ND	0.00800B	24.6
OS-PW-05	30.5	41.9	0.0410	1.54	0.403	1.02	ND	ND	0.00600B	38.1
OS-PW-06	25.9	37.6	0.0430	1.02	0.305	0.180	ND	ND	ND	12.5
OS-PW-07	38.3	41.7	0.104	1.24	0.170	4.57	ND	ND	ND	5.47
OS-PW-08	15.4	58.0	0.0850	1.82	1.00	0.470	ND	ND	ND	91.5
OS-PW-10	19.3	33.7	0.110	0.610	0.290	2.31	ND	ND	ND	17.4
OS-PW-11	19.8	36.3	0.160	0.490	1.69	2.32	ND	ND	ND	80.5
OS-PW-12	22.9	37.4	0.190	1.78	1.32	1.00	ND	ND	0.0300B	56.5
OS-PW-13	22.4	31.8	0.130	1.47	0.490	0.920	ND	ND	ND	22.0
OS-PW-14	22.7	36.6	0.130	0.610	0.390	0.700	ND	ND	ND	15.2
RF-1	15.6	31.7E	ND	ND	ND	0.447B	ND	10.6	2.82N	7.07B
RF1-FD	14.0	30.5E	ND	ND	ND	0.266B	ND	11.1	ND	6.51B
RF-2	10.7	32.4E	ND	ND	ND	0.861B	ND	13.5	ND	5.82B
RF-2	10.7	32.4E	ND	ND	ND	0.861B	ND	13.5	ND	5.82B
RF3	13.9	22.5E	ND	ND	ND	ND	ND	6.17	ND	7.79B
RF4	16.6	63.9E	ND	ND	1.29B	0.506B	ND	7.41	ND	7.08B
MW RF5-FD	19.7	34.7E	ND	2.70B	ND	ND	ND	7.09	ND	5.37B
RINSATE-S4	ND	0.140	ND	0.530	0.0600	1.37	ND	ND	ND	4.20
RINSATE-S6	ND	0.659	0.0130B	0.180B	0.143	0.500	ND	ND	0.00800B	7.46
RINSATE-S7	ND	0.210	0.120	0.360B	0.140	0.780	ND	ND	0.0300B	7.20
RINSATE-S8	ND	0.300	ND	0.250	0.100	0.700	ND	ND	0.0500	6.90
SA GGW-01	16.3	39.7	0.145	1.62	0.365	91.6	ND	ND	0.00900B	6.51
SA GGW-01-FD	16.5	41.0	0.0450	2.18	0.0460	105	ND	ND	ND	5.28
SI-GGW-01	8.50	68.6	ND	0.850	0.220	37.7	ND	ND	ND	5.90
SI-GGW-02	11.6	51.2	ND	0.860	0.120	58.0	ND	ND	ND	4.20
SI-GGW-03	7.40	34.3	0.170	1.13	0.500	24.0	ND	ND	ND	7.40
SI-GGW-03-FD	7.30	35.1	0.150	0.560	0.120	23.90	ND	ND	ND	4.90

TABLE 6 (Continued)

**OFF-SITE DISSOLVED METALS CONCENTRATIONS IN  
GROUNDWATER AND WASTEWATER, ANALYTICAL RESULTS SUMMARY  
AGROMAC-LOCKWOOD, OPERABLE UNIT 2 - GERING, NEBRASKA  
(RESULTS REPORTED IN MICROGRAMS PER LITER)**

Sample Number	Arsenic	Barium	Cadmium	Chromium	Lead	Manganese	Mercury	Selenium	Silver	Zinc
MCL	50.0	2000	5.00	100	15.0	NA	11.0	50.0	NA	NA
PRG	NA	2600	NA	NA	NA	880	2.00	180	180	11000
SI-GGW-04	9.90	57.7	0.170	0.850	0.330	67.6	ND	ND	ND	8.50
SMWB-WW	11.6	97.9	1.83	1.09	5.85	544	ND	ND	0.100B	206

## Notes:

- Data field highlighted with gray indicates the result exceeds one or both of the health-based standards.

- PRG numbers are based on tap water.

- Health-based standards and results are reported in micrograms per Liter.

- Appendix E provides a sample nomenclature description.

B- Reported value was less than the contract-required detection limits, but greater than or equal to the instrument detection limit.

E- The reported value was estimated because of interference.

MCL- Maximum contaminant level

NA- Not applicable

ND- Not detected

PRG- Preliminary remediation goal

#### 4.4 TCLP METALS

Eight sludge samples were submitted to the Columbia Analytical Services laboratory in Rochester, New York, for TCLP analysis. The sludge samples were analyzed for the RCRA metals plus manganese and zinc by EPA SW-846 Method 6010B. The samples were extracted by EPA Method 1311. Analytical data packages for the Columbia Analytical Services laboratory results are provided in Attachment 8. A summary of the TCLP metals results is included as Table 7. The results in the data summary table that exceeded the TCLP regulatory levels have been highlighted with gray. Arsenic, cadmium, chromium, and lead were reported at concentrations above their respective TCLP regulatory levels. Figure 13 displays sample collection points and TCLP metals results that exceeded their respective TCLP regulatory levels.

TABLE 7

**OFF-SITE TCLP METALS CONCENTRATIONS, ANALYTICAL RESULTS SUMMARY  
AGROMAC-LOCKWOOD, OPERABLE UNIT 2 - GERING, NEBRASKA  
(RESULTS REPORTED IN MILLIGRAMS PER LITER)**

Sample Number	Arsenic	Barium	Cadmium	Chromium	Lead	Manganese	Mercury	Selenium	Silver	Zinc
TCLP Reg. Level	5.00	100	1.00	5.00	5.00	NA	0.200	1.00	5.00	NA
BAC-1	3120N	ND	351	ND	ND	51200	ND	ND	ND	6040000
HWSC-SLU	ND	ND	ND	ND	ND	2330	ND	ND	ND	42600
MTS-GB-SLU-1	ND	ND	261	ND	ND	14400	0.180B	ND	ND	1760000
MTS-GB-SLU-2	ND	ND	ND	ND	ND	3090	ND	ND	ND	66200
MTS-GB-SLU-4	ND	ND	ND	ND	ND	51.6	ND	ND	ND	ND
ST-SLU	ND	ND	ND	ND	ND	332	ND	ND	ND	3660
BAC-SLU	ND	ND	1830	ND	ND	75900	0.180B	ND	ND	5710000
MTS-GB-SLU-3	ND	ND	319	ND	ND	30900	ND	ND	ND	3460000

## Notes:

Data field highlighted with gray indicates the result exceeds the TCLP regulatory level.

TCLP regulatory level and results are reported in milligrams per Liter.

Appendix E provides a sample nomenclature description.

B Reported value was less than the contract-required detection limits but greater than or equal to the instrument detection limit.

N Spiked sample recovery was not within control limits.

NA Not applicable

ND Not detected

Reg. Regulatory

TCLP Toxicity characteristic leaching procedure

#### 4.5 ORGANIC CONSTITUENTS IN SOIL AND SLUDGE

Three hundred sixty-two soil and sludge samples were screened for VOCs with a hand-held PID. The VOC screening results are included in Appendix I. Of the 362 samples screened on site, 26 exhibited significant readings on the hand-held PID. The samples that exhibited high VOC readings were analyzed by the MLP and Columbia Analytical Services laboratory. The MLP analyzed the samples for PCE, 1,1,1-TCA, and TCE the results for which are summarized in Table 8. The samples shipped to Columbia Analytical Services laboratory in Rochester, New York, were analyzed for VOCs by EPA SW-846 Methods 8260/5035. Table 9 summarizes the VOC results from the Columbia Analytical Services laboratory. Sludge sample MTS-GB-SLU-3 was submitted for analysis of SVOCs and TPH by EPA SW-846 Method 8270 and EPA Method 418.1, respectively. Bis(2-ethylhexyl)phthalate was reported in the sample at a concentration of 1300  $\mu\text{g/kg}$ . The same sample also exhibited a TPH concentration of 1610 mg/kg. The bis(2-ethylhexyl)phthalate detection value was estimated. The results for bis(2-ethylhexyl)phthalate is considered to be insignificant because of its relatively low concentration compared to its PRG of 180,000  $\mu\text{g/kg}$ . There is no PRG value to compare the TPH result to. SWMB-SLU was submitted for TPH analysis by EPA Method 418.1. TPH was reported at 550,000 milligrams per kilogram. Again, there is no PRG value to compare the TPH detection to. Analytical data packages from the Columbia Analytical Services laboratory and the MLP are provided in Attachment 8 and Appendix J, respectively. PRGs were used for comparison purposes because the state of Nebraska has no established cleanup guidelines. Organic compounds were not reported above their respective PRGs. Figures 3 and 6 display sample collection points and areas.

TABLE 8

ON-SITE VOLATILE ORGANIC COMPOUND CONCENTRATIONS IN SOIL,  
ANALYTICAL RESULTS SUMMARY  
AGROMAC-LOCKWOOD, OPERABLE UNIT 2 - GERING, NEBRASKA  
(RESULTS REPORTED IN MICROGRAMS PER KILOGRAM)

Sample Number	1,1,1-Trichloroethane	Trichloroethene	Tetrachloroethene
PRG	1400	610	120
OS-S-3-6/10	0.553	ND	ND
SI-S-1-10/14	ND	ND	0.234
SI-S-4-10/14	ND	ND	0.166
SWD-S-1-0/2	ND	ND	0.141

## Notes:

Volatile organic compounds were not detected if the sample is not listed above.

PRG numbers are based on industrial soil guidelines.

PRG and results are reported in micrograms per Kilogram.

Appendix E provides a sample nomenclature description.

ND Not detected

PRG Preliminary remediation goal

TABLE 9

**OFF-SITE VOLATILE ORGANIC COMPOUND CONCENTRATIONS  
IN SOIL AND SLUDGE, ANALYTICAL RESULTS SUMMARY  
AGROMAC-LOCKWOOD, OPERABLE UNIT 2 - GERING, NEBRASKA  
(RESULTS REPORTED IN MICROGRAMS PER KILOGRAM)**

Sample Number	Acetone	2-Propanone	Carbon Disulfide	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	Dibromobenzene	2-Hexanone	4-Methyl-2-pentanone	Perchloroethene	Toluene	O-Xylene	m,p-Xylene
PRG	6200000	28000000	720000	540000	6500	520	270	230000	NA	NA	19000	520000	210000	420000
BAC-SLU	170	29.0J	ND	ND	ND	ND	ND	ND	ND	11.0J	ND	ND	ND	ND
HWSC-SLU	1600E	350E	19.0	ND	ND	ND	ND	2.00J	45.0	74.0	ND	4.50J	2.80J	6.30J
MTS-GB-SLU-1	140	24.0	2.50J	ND	2.70J	ND	11.0	14.0	1.30J	2.00J	ND	ND	22.0	61.0
MTS-GB-SLU-1	87.0	12.0J	2.40J	ND	ND	ND	2.90J	13.0	ND	ND	ND	ND	20.0	61.0
MTS-GB-SLU-2	95.0	22.0J	ND	ND	ND	ND	ND	ND	4.40J	4.30J	ND	ND	ND	ND
MTS-GB-SLU-2	200	44.0	ND	ND	ND	ND	ND	3.80J	6.20J	7.00J	ND	ND	6.10J	16.0
MTS-GB-SLU-3	190	39.0	2.90J	ND	ND	ND	ND	720E	ND	7.00J	ND	15.0	1000E	2700E
MTS-GB-SLU-3	790J	250J	ND	ND	ND	ND	ND	2500	ND	ND	ND	ND	3700	9700
MTS-GB-SLU-4	52.0	2.80J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MTS-GB-SLU-4	73.0	9.50J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
OS-S-1-0/2	26.0	3.00J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
OS-S-1-10/14	4.70J	ND	ND	ND	ND	ND	ND	ND	2.30J	1.70J	ND	ND	ND	ND
OS-S-1-2/6	230J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
OS-S-1-6/10	10.0J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
OS-S-2-0/2	57.0	4.80J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SG-12-CON-12	16.0J	2.10J	ND	ND	ND	ND	ND	ND	ND	ND	2.50J	ND	ND	ND
SG-18-CON-11	14.0J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SG-5-CON-14	17.0J	11.0J	ND	ND	ND	ND	ND	ND	8.50J	7.90J	ND	ND	ND	ND
SG-6-CON-12	12.0J	2.70J	ND	ND	ND	ND	ND	ND	1.80J	1.20J	ND	ND	ND	ND
SI-S-1-10/14	10.0J	2.00J	1.30J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SI-S-4-10/14	5.70J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SI-S-4-6/10	17.0	1.90J	2.20J	ND	ND	ND	ND	ND	ND	3.60J	ND	ND	ND	ND
SMWB-SLU	18000E	2900	2500	150	ND	ND	190	82.0	820	12000E	ND	190	97.0	310
SMWB-SLU	ND	ND	2000J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SR-S-3-2/6	69.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SR-S-3-2/6-FD	12.0J	ND	ND	ND	ND	ND	ND	ND	1.60J	ND	ND	ND	ND	ND
SR-S-3-6/10	16.0J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ST-SLU	18000E	9500E	550	ND	ND	ND	ND	1400	ND	ND	ND	ND	750	1100
ST-SLU	13000J	11000J	ND	ND	ND	ND	ND	1800J	ND	ND	ND	ND	ND	1400J
SW BLANK	ND	ND	ND	ND	ND	1.60J	ND	ND	ND	ND	ND	ND	ND	ND
SWD-S-1-2/4	190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

## Notes:

PRG numbers are based on industrial soil guidelines.

PRGs and results are reported in micrograms per Kilogram.

Appendix E provides a sample nomenclature description.

Volatile organic compounds were not detected if the sample is not listed above.

Sample results listed twice are not field duplicates. The laboratory simply ran the sample twice, and both results are reported.

E Compounds concentrations exceeded calibration range.

J Estimated value

NA Not applicable

ND Not detected

PRG Preliminary remediation goal



#### 4.6 ORGANIC CONSTITUENTS IN GROUNDWATER

Fifty-two groundwater samples were collected and analyzed by both the MLP and the Columbia Analytical Services laboratory. The MLP analyzed the groundwater samples for PCE, 1,1,1-TCA, and TCE. Table 10 summarizes PCE, 1,1,1-TCA, and TCE results from the MLP for groundwater. The samples shipped to the Columbia Analytical Services laboratory in Rochester, New York, were analyzed for VOCs in groundwater by EPA SW-846 Method 8260. Table 11 summarizes the VOC results from the Columbia Analytical Services laboratory. Analytical data packages from the Columbia Analytical Services laboratory and the MLP are provided in Attachment 8 and Appendix J, respectively. Six off-site samples exceeded PRGs for either chloroform or chloroform. It should be noted that four of the six samples exceeded the PRG for chloroform. These four samples were rinsate quality assurance samples poured from store-bought distilled water. Chloroform, a byproduct of the disinfection process, is commonly found in distilled water. Samples from monitoring well RF-05 and Geoprobe™ temporary well SA-GGW-1 exceeded the PRG for PCE. No VOCs were reported above MCLs. PRGs and MCLs were used for comparison purposes because the state of Nebraska has no established cleanup guidelines. Figure 14 displays sample collection points for on-site groundwater and confirmation sample VOC concentrations that exceeded their respective PRGs.

TABLE 10

**ON-SITE VOLATILE ORGANIC COMPOUND CONCENTRATIONS  
IN GROUNDWATER, ANALYTICAL RESULTS SUMMARY  
AGROMAC-LOCKWOOD, OPERABLE UNIT 2 – GERING, NEBRASKA  
(RESULTS REPORTED IN MICROGRAMS PER LITER)**

Sample Number	1,1,1-Trichloroethane	Trichloroethene	Tetrachloroethene
MCL	200	5.00	5.00
PRG	540	1.60	1.10
MW LW-2	ND	ND	0.255
MW LW-3	ND	0.135	1.07
MW LW-6	ND	ND	0.265
MW LW-7	ND	0.626	
MW LW-7-FD	ND	0.591	1.01
MW LW-8	ND	ND	0.290
MW M-1	ND	ND	0.123
MW M-2	0.222	0.154	0.136
MW M-8	0.134	0.130	ND
RF 5	ND	ND	1.55
RF 5-FD	ND	ND	1.44
OS-PW-11	ND	ND	0.179
OS-PW-12	ND	ND	0.106
SA-GGW-1	ND	ND	1.19
SA-GGW-1-FD	0.141	ND	1.364

## Notes:

Data field highlighted with gray indicates the result exceeded one or both of the health-based standards.

PRG numbers are based on tap water.

Health based standards and results are reported in micrograms per liter.

Appendix E provides a sample nomenclature description.

Volatile organic compounds were not detected if the sample is not listed above.

MCL Maximum contaminant level

ND Not detected

PRG Preliminary remediation goal

TABLE 11

**OFF-SITE VOLATILE ORGANIC COMPOUNDS CONCENTRATIONS  
IN GROUNDWATER, ANALYTICAL RESULTS SUMMARY  
AGROMAC-LOCKWOOD, OPERABLE UNIT 2 – GERING, NEBRASKA  
RESULTS REPORTED IN MICROGRAMS PER LITER**

Sample Number	Benzene	2-Butanone	Chloroform	2-Hexanone	4-Methyl-2-Pentanone	Tetrachloroethene
MCL	5.00	NA	100	NA	NA	5.00
PRG	0.350	1900	0.160	NA	NA	1.10
MW LW-03	ND	ND	ND	ND	ND	0.99J
MW LW-07	ND	ND	ND	ND	ND	0.96J
MW LW-07-FD	ND	ND	ND	ND	ND	0.89J
MW M-04	1.20J	ND	ND	ND	ND	ND
MW RF05-FD	ND	ND	ND	ND	ND	1.20
RF 05	ND	ND	ND	ND	ND	1.40
RINSATE-06	ND	ND	1.80J	ND	ND	ND
RINSATE-S03	ND	ND	2.20J	ND	ND	ND
RINSATE-S04	ND	ND	1.90J	ND	ND	ND
RINSATE-S07	ND	ND	1.50J	ND	ND	ND
SA GGW-01	ND	ND	ND	ND	ND	2.10
SA GGW-01 FD	ND	ND	ND	ND	ND	2.30
SMWB-WW	ND	26.0	ND	4.10J	5.80J	ND

## Notes:

Data field highlighted with gray indicates the result exceeds one or both of the health-based standards.

PRG numbers are based on tap water.

Health based standards and results are reported in micrograms per liter.

Appendix E provides a sample nomenclature description.

Volatile organic compounds were not detected if the sample is not listed above.

J Estimated value

MCL Maximum contaminant level

NA Not applicable

ND Not detected

PRG Preliminary remediation goal

## 5.0 DATA COMPARABILITY

This section discusses the comparability between on-site and off-site data for analyses of metals and VOCs. The Columbia Analytical Services laboratory (off site) analyzed soil, sludge, and groundwater samples to determine concentrations of metals and VOCs for comparison with XRF screening results (on site) and MLP results (on site). The measure of agreement ( $r^2$ ) between the on-site and off-site analytical data was considered to be acceptable if it was greater than 0.700. The measurement of agreement could only be calculated for barium, lead, and zinc, because arsenic, cadmium, manganese, and silver had no data sets to compare. Chromium and mercury had four and six data sets to compare, respectively; however, valid statistical inferences cannot be drawn from a data set of less than 10.

During the RA, all soil samples reported by the MLP with concentrations exceeding a PRG were submitted to the off-site confirmation laboratory. If both the on-site analysis and confirmation laboratory reported that the sample concentrations exceeded respectable detection limits, results were considered to be comparable. If the confirmation laboratory did not report an exceedance of a PRG when on-site analysis did, this result was evaluated as a false positive result generated by on-site analysis. If the confirmation laboratory reported that a PRG was exceeded when the on-site analysis did not, this was evaluated as a false negative reported by the on-site analysis. During the RA sampling, additional soil samples were split with the confirmation laboratory from a broad range of concentrations, as reported by on-site analysis. The confirmation laboratory results were reviewed for reported concentrations exceeding the respectable detection limits. The paired results of the samples split between on-site analysis and the confirmation laboratory have been included on tables provided as Appendix K.

### Lead and Zinc

The correlation coefficients for 33 pairs of lead results (detects only) and 39 pairs of zinc results (detects only) were calculated to be 0.976 and 0.970, respectively. These correlation coefficients are well above the acceptable standard of 0.700 set forth by EPA Region 7.

To assess data usability, the results exceeding the PRG for lead (750 mg/kg) and zinc (100,000 mg/kg) reported by either laboratory were reviewed. The results of the lead analyses indicated that of the 54

pairs of split samples, both laboratories reported five results exceeding the PRG for lead. There were no false positives reported by on-site analysis.

There was one false negative for lead, it occurred in sample HWSC-S-C-0/2. This false negative appears to have been caused by the sample matrix, rather than the analytical method. This sample was also a false negative for zinc. The confirmation laboratory reported a lead concentration of 1,390 mg/kg and a zinc concentration of 149,000, while the on-site analysis reported 587 mg/kg and 16,000 mg/kg, respectively. Overall, the XRF data generated for the site accurately represented lead concentrations across the site.

The results of the zinc analyses show that there was one false positive (MTS-GB-SLU-3) and one false negative (HWSC-S-C-0/2) reported by on-site analyses. The false positive result occurred in a sludge sample, which may have had a high degree of matrix variability. The false negative result was previously discussed in the lead result discussion. Overall, the XRF data generated for the site accurately represent zinc concentrations across the site.

#### Arsenic

There were no data sets showing concurrent detections reported by the two laboratories, so no correlation could be calculated. All results reported by each laboratory were either non-detections or well below the PRG (440 mg/kg). The arsenic results reported by the confirmation laboratory were all below 44 mg/kg. The maximum concentration reported by the MLP was 183 mg/kg. Based on this range of reported detections, the XRF data generated for the site accurately represent arsenic concentrations across the site with respect to the PRG.

#### Barium

A comparison of detections of barium reported by the two laboratories showed a fair measure of agreement between the two data sets. All results reported by both laboratories were at or below 1,000 mg/kg, well below the PRG (100,000 mg/kg). Based on this reported range of detections, the XRF data generated for the site accurately represent barium concentrations across the site with respect to the PRG.

### Cadmium

There were no data sets showing concurrent detections reported by the two laboratories, so no correlation could be calculated. Cadmium detection limits for on-site analyses were generally below 65 mg/kg. The confirmation laboratory reported concentrations in soil that were below 3 mg/kg and in sludge that were below 50 mg/kg. These results are well below the PRG for cadmium (810 mg/kg). Based on this range of reported range of detections, the XRF data generated for the site accurately represent cadmium concentrations across the site with respect to the PRG.

### Chromium

There were only four data sets to compare, so no relevant correlation could be calculated between the two laboratories. The on-site analyses reported six soil sample results which exceeded the PRG (450 mg/kg), five of which were false positives. The confirmation laboratory reported three samples, all sludges, at concentrations exceeding the PRG. These were reported below the PRG by the MLP. These three false negatives reported by the MLP were in sludge samples with very high concentrations of zinc. The high concentrations of zinc may have introduced a matrix effect, causing the false negatives for chromium. All chromium concentrations reported by the confirmation laboratory in soil were, with one exception, below 37 mg/kg. Based on this reported range of detections, the XRF data generated for the site accurately represent chromium in soil concentrations across the site with respect to the PRG.

### Manganese

There were no data sets showing concurrent detections reported by the two laboratories, so no correlation could be calculated. No detections of manganese were reported by on-site analysis. The maximum concentrations reported by the confirmation laboratory were less than 500 mg/kg, well below the PRG (32,000 mg/kg). Based on this reported range of detections, the XRF data generated for the site accurately represent manganese concentrations across the site with respect to the PRG.

### Mercury

There were no data sets showing concurrent detections reported by the two laboratories, so no correlation could be calculated. There was one false positive result for mercury reported by the on-site analysis in sludge sample "METALLIC" at a concentration exceeding the PRG (610 mg/kg). The on-site analyses reported mercury in the range of 30 to 40 mg/kg in several soil samples, although the corresponding confirmation results were below 0.03 mg/kg. The on-site analyses consistently reported results that were significantly above those reported by the confirmation laboratory; consequently, there appeared to be an interference in the on-site mercury analyses caused by high zinc concentrations in the sludge and soil samples. All results reported by the confirmation laboratory were below 0.5 mg/kg. Based on this reported range of detections, the XRF data generated for the site accurately represent mercury concentrations across the site with respect to the PRG.

### Selenium

There were no data sets showing concurrent detections reported by the two laboratories, so no correlation could be calculated. Selenium was not reported in the on-site data. All results reported by the confirmation laboratory were below 16 mg/kg, well below the PRG (10,000 mg/kg). Based on this reported range of detections, the XRF data generated for the site accurately represent selenium concentrations across the site with respect to the PRG.

### Silver

There were no data sets showing concurrent detections reported by the two laboratories, so no correlation could be calculated. Silver was not reported in the on-site data at a concentration that exceeded the PRG (10,000 mg/kg). All results reported by the confirmation laboratory were below 1.8 mg/kg, well below the PRG. Based on this reported range of detections, the XRF data generated for the site accurately represent silver concentrations across the site with respect to the PRG.

### VOCs in Groundwater

There were only six data sets showing concurrent detections reported by the two laboratories, so no correlation could be calculated. PCE was the only chlorinated VOC reported by the confirmation laboratory. Other chlorinated VOCs, including 1,1,1-TCA and TCE, were reported by the MLP at concentrations below 1 µg/L. These reported concentrations were below the instrument detection limit (1 µg/L) used by the confirmation laboratory. There were no detections above the MCL for PCE (5.0 µg/L) reported by either laboratory. There were no false negatives reported by the MLP. The MLP reported PCE in six of the split groundwater samples, which were reported as non-detections by the confirmation laboratory. This was because the reporting limit used by the MLP was lower than the instrument detection limit used by the confirmation laboratory. Based on these results, it appears that the VOC concentrations reported by the MLP for the groundwater samples collected during the RA accurately represent the VOC concentrations.

### VOCs in Soil

There were no data sets showing concurrent detections reported by the two laboratories, so no correlation could be calculated. No chlorinated VOC concentrations were reported in the soil samples submitted to the confirmation laboratory. Chlorinated VOC concentrations, including PCE and 1,1,1-TCA, were reported by the MLP at concentrations below 1 µg/kg. These reported concentrations were below the instrument detection limit (1 µg/kg) used by the confirmation laboratory.

## **6.0 REMOVAL CONSIDERATIONS**

The analytical results of the soil, sludge, and groundwater samples were evaluated to assess the locations at which removal action may be required. A removal site evaluation form (RSE) is included as Appendix L.

Three hundred sixty-two soil samples were screened on site using a NITON™ XRF spectrometer for the eight RCRA metals plus manganese, molybdenum, nickel, and zinc. Field screening was used to select soil samples to submit for laboratory confirmation analysis. All soil samples exceeding a PRG were submitted for confirmation analysis. Of the 362 samples analyzed on site, 59 were submitted for



confirmation analysis. The results of the confirmation analyses were evaluated by comparing these results with the Region 9 PRGs, as previously specified in the QAPP (Tetra Tech 2002). Figure 8 shows the soil sampling locations where confirmation results exceeded a PRG.

Based on the results of the laboratory confirmation analyses, PRGs were exceeded in soil samples collected from the following potential source areas: hazardous waste storage area C exceeded the PRG for lead and zinc, the zinc plating bath sump exceeded the PRG for lead and zinc, the oil storage and empty drum storage area exceeded the PRG for lead, and the raw product storage area exceeded the PRG for lead. Those areas where soil sampling results exceeded a PRG may require a removal action. Soils should be handled in accordance with all applicable federal, state, and local regulations.

Sludge was sampled and analyzed by the confirmation laboratory for TCLP metals. The results are provided in Table 7, and the sludge sampling locations are shown on Figure 6. The following potential source areas contained sludges with reported concentrations exceeding regulatory levels for a RCRA toxicity characteristic hazardous waste. The beta acid crystals are RCRA characteristic hazardous waste for arsenic and cadmium. Precipitated beta acid crystals, which had formed on the outside of the cloth super sacks used to store the beta acid crystals, are RCRA characteristic hazardous waste for arsenic, cadmium, chromium, and lead. The former caustic wash tank sump sludge (sample MTS-GB-SLU-1) is RCRA characteristic hazardous waste for cadmium and lead. The former rinse tank and pre-flux tank sump sludge (sample MTS-GB-SLU-3) is RCRA characteristic hazardous waste for cadmium. VOCs were reported in sludge samples at concentrations well below RCRA regulatory limits. Those potential sources where sludge sampling results exceed a regulatory level for RCRA toxicity characteristic hazardous waste may require a removal action. All sludge should be handled in accordance with applicable federal, state, and local regulations.

The 32, 1-ton sacks of beta acid crystals being stored on site were sold and were transported off site after completion of the ISA. The dimensions of the sumps containing RCRA hazardous waste were measured to estimate the approximate volume of waste. The sludge in the sumps was approximately 1 foot thick. The estimated volume of sludge in the former caustic wash tank sump is 30 cubic yards. The estimated volume of sludge in the rinse water and pre-flux tank sump is 14 cubic yards.

One additional area of concern is the metallic slag that has pooled under the former zinc tank sump. The total metal results for lead (12,700 mg/kg) suggest that this material may be a RCRA characteristic hazardous waste for lead. The volume of this slag is unknown because it could not be penetrated during Geoprobe™ sampling; therefore, the thickness of the slag is unknown. The TPH concentration (550,000 µg/kg) reported in sludge sample SMWB-SLU (collected from a sump in the hazardous waste pad at the former scrap metal waste bin area) may also be of concern.

During the site reconnaissance, stored drums of chemicals were observed in the chemical storage area. Representatives for AII indicated that these chemicals were abandoned by Lockwood-Powerhorse Corporation when they ceased operations in 1999. AII indicated that it was trying to sell these chemicals and provided an inventory of chemicals (see Attachment 6). Approximately 11 drums of chemicals were identified in this inventory. Chemicals in this inventory included corrosives such as ammonium hydroxide, sulfuric acid, and hydrochloric acid. Other chemicals listed in this inventory were used in plating operations and had warning labels stating, "extreme danger to health" or "hazardous to health." Thirteen 50-pound bags of ammonium chloride were also listed in the inventory. Approximately 20 smaller containers of various chemicals were observed in the chemical storage area during the site reconnaissance that were not included in this inventory. During the ISA, four drums filled with unidentified liquids were found on site. Hazard categorization was performed on these drums during the ISA. Two of these drums appeared to contain waste oil, one drum contained gasoline, and the contents of the fourth drum could not be readily identified. The locations where these drums were found is shown on Figure 6. Proper disposal of these chemicals may require a removal action. Chemicals should be handled in accordance with applicable federal, state, and local regulations.

Groundwater sampling results reported by the MLP for samples collected on site indicated that concentrations of PCE, 1,1,1-TCA, and TCE were present in groundwater, although at concentrations below their MCLs. PCE was reported at concentrations exceeding the PRG for PCE in groundwater (1.1 µg/L) in on-site groundwater samples. No PRGs or MCLs were exceeded in the off-site private and municipal well samples. Soil and soil gas sampling results from the MLP confirmed that these VOCs were present in soil and soil vapors, but at concentrations well below their PRGs. No source area of VOCs in soil was identified during the ISA sampling activity. No VOCs were reported in off-site private and municipal well samples, as reported by the confirmation laboratory. PCE and benzene were reported by the confirmation laboratory in groundwater samples collected on site, at concentrations well below

their MCLs. The PRGs for benzene (0.35 µg/L) and for PCE (1.1 µg/L) were exceeded in groundwater sample results reported by the confirmation laboratory. Chloroform was also detected, but it was suspected to be present in the commercial deionized water used to pour the rinsate blanks. No other VOCs were reported by the confirmation laboratory.

There is a potential that some off-site private wells may be impacted by VOCs migrating from the site. There are a significant number of private wells located to the northeast of the site, in the direction of groundwater flow, that could not be accessed for sampling during the ISA. In most cases, this was because the property owners denied access. The locations of these wells are highlighted in red on Figure 5. Many of these wells have never been sampled.

The data for total metals in groundwater contained numerous results exceeding the MCLs and PRGs. These results are shown in Table 5. Many of the samples which exceeding the MCLs and PRGs were collected from Geoprobe™ temporary wells, including those advanced at off-site background locations. Groundwater samples collected from Geoprobe™ temporary wells are more turbid, and the high sediment content in these water samples appears to have biased results high. The results of total metals analyses were not reported as exceeding the MCLs and PRGs for this reason. Manganese was the metal that exceeded the PRG with the highest frequency. Manganese results were above the PRG for the following monitoring wells; MW LW-03, MW LW-04, MW LW-05, MW LW-07, MW M-01, MW M-04, and MW M-06. Lead results were above the MCL in monitoring well MW LW-07. Arsenic results were above the MCL for monitoring wells MW LW-08 and MW LW-05.

The analytical results for the dissolved metals in groundwater are summarized in Table 6. The only dissolved metals reported above the MCLs or PRGs were manganese and zinc. Manganese was reported at concentrations above the PRG for the following on-site sampling locations; SWD-GGW-01, SI-GGW-03, OSEDS-GGW-01, MW M-4, MW M-3, MW M1, and GB-GGW-02. Zinc was also detected above the PRG in results reported for Geoprobe™ temporary monitoring well GB-GGW-02, which was located inside the galvanizing building. The dissolved manganese results exceeding the PRG were generally collected in the vicinity of the closed surface impoundment.

Dissolved manganese was reported above the PRG for one off-site sampling location, OS-GGW-3. This location was a Geoprobe™ temporary monitoring well located 150 feet west of the closed surface

impoundment. The locations where dissolved metals sampling results were reported above the PRG are shown on Figures 11 and 12.

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